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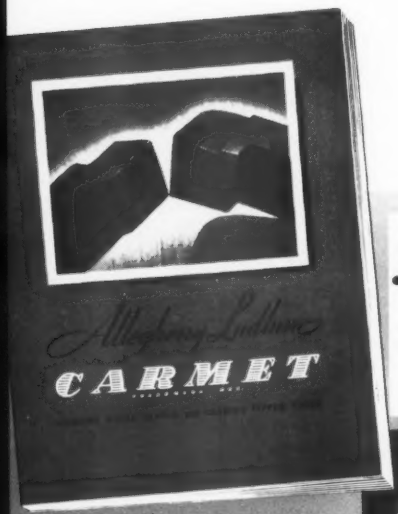

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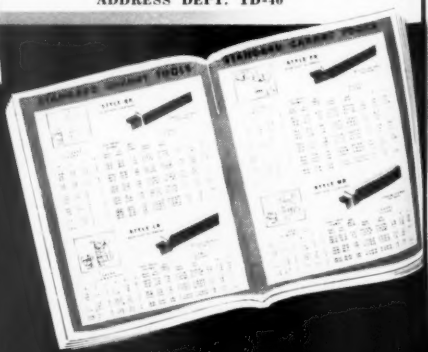

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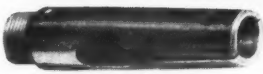

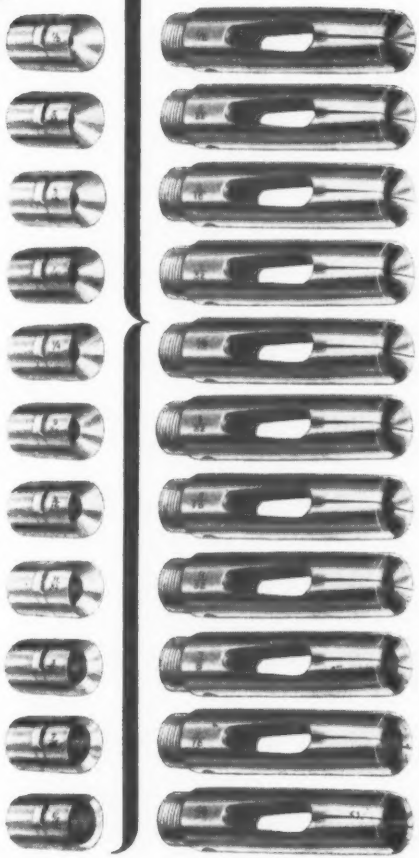

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Controlled Circulation—CBI Coverage
Official Publication: The Tooling Institute

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TOOL & DIE JOURNAL

Editorial and Publication Offices
2460 FAIRMOUNT BOULEVARD—CLEVELAND 6, O.
FAirmount 4040

Vol. XI, No. 6 September, 1945

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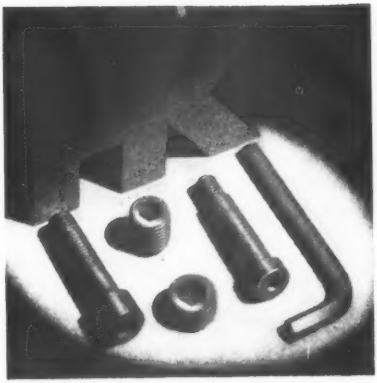

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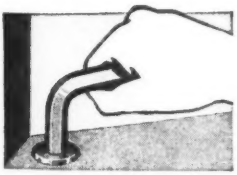

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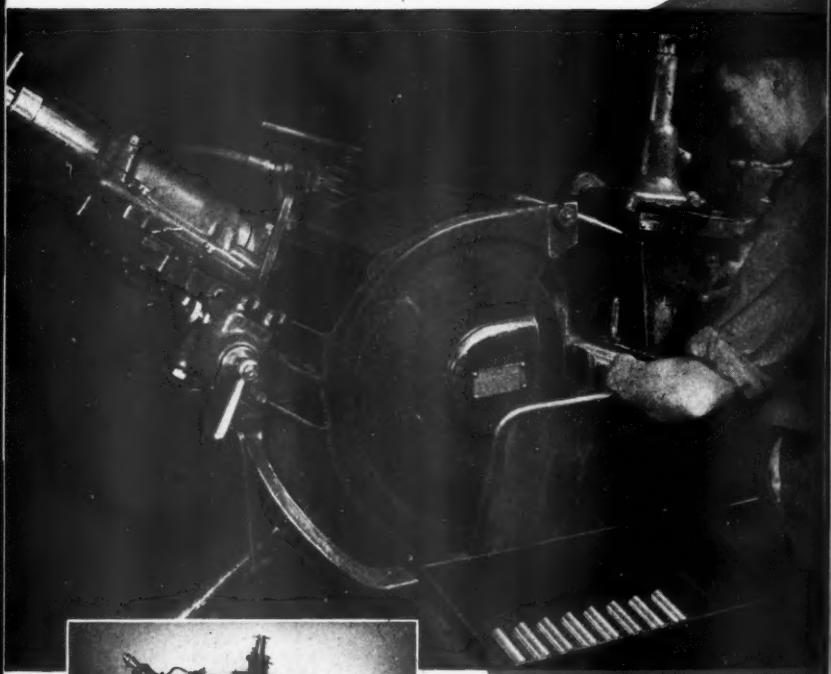

The **CINCINNATI** *Centerless illustrated above is truly a Veteran of Production Wars. It has been in continuous operation since 1937 with no down time charged against the grinding wheel spindle bearings, thanks to* ***FILMATIC****.*

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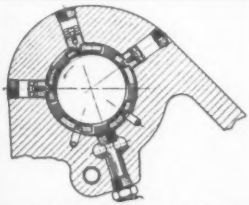
CINCINNATI

CENTER TYPE GRINDING MACHINES

FILMATIC

VETERAN OF PRODUCTION WARS



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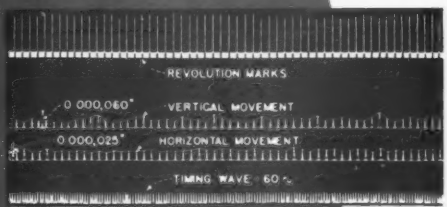
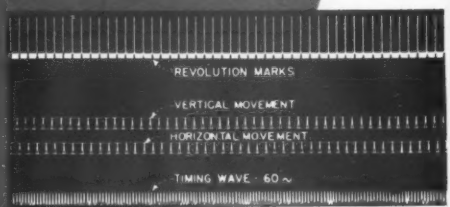


Old-style bearing. Tips of wave peaks indicate the spindle position once each revolution. The irregularity in position of the wave tips indicates a slight fluttering of the spindle axis.



FILMATIC Bearings. No discernible spindle flutter. The position of the wave tips in this oscillogram indicates a true running spindle.

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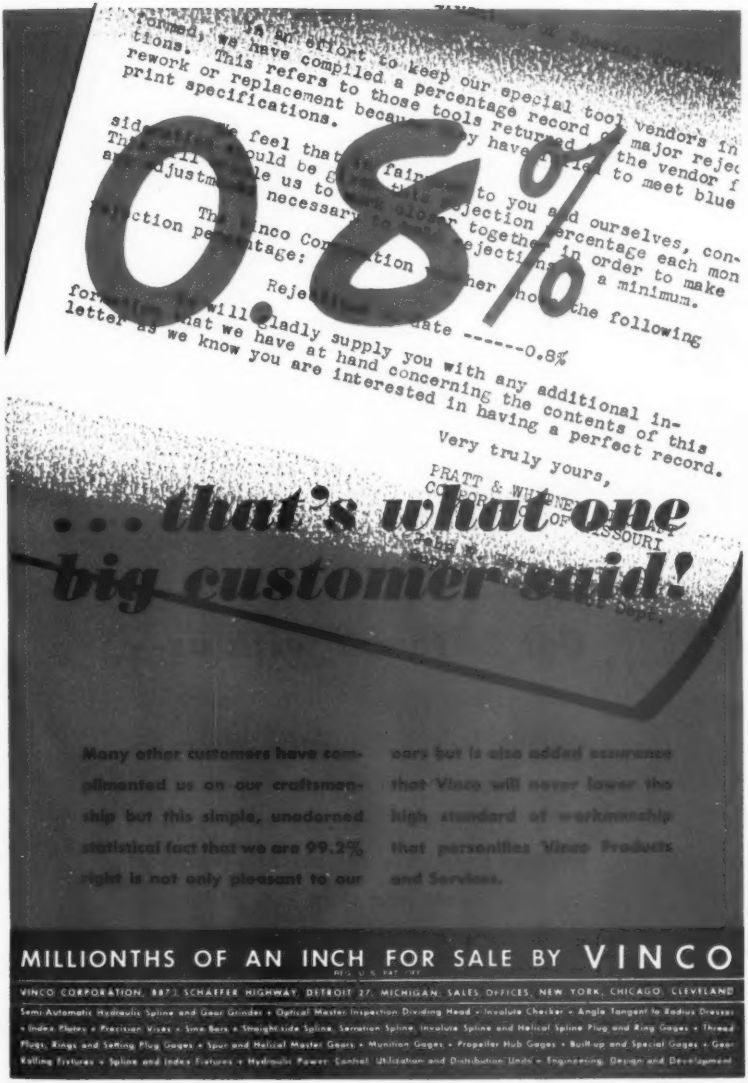
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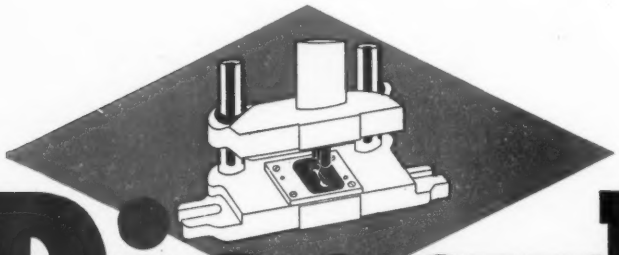

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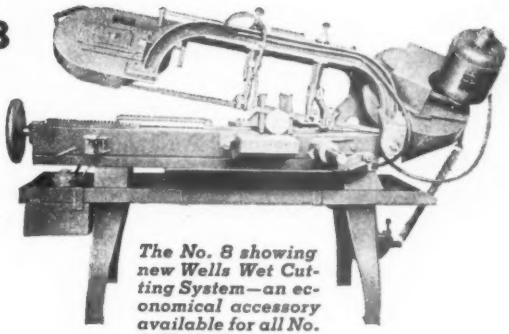
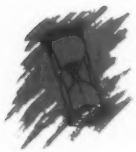


The No. 8 showing new Wells Wet Cutting System—an economical accessory available for all No. 8 Wells Saws.



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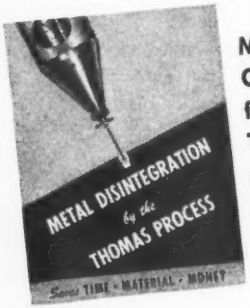

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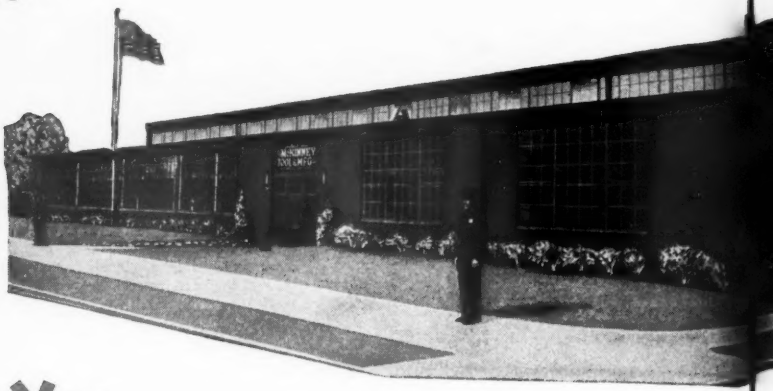

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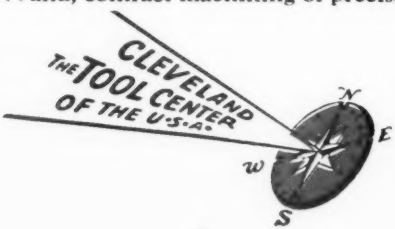
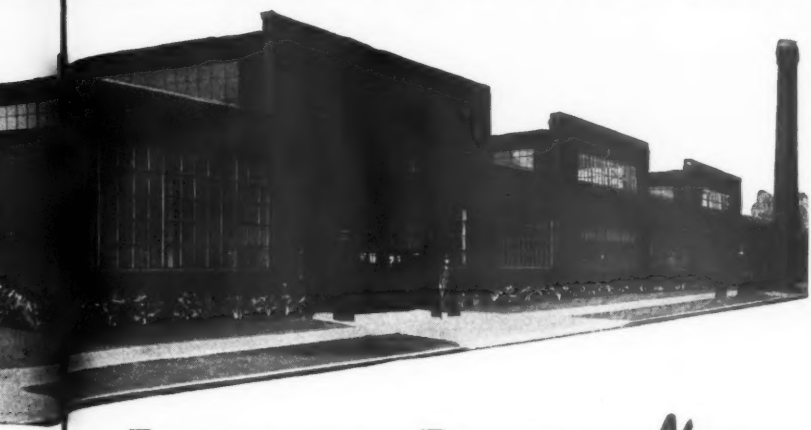


VAR TO PRODUCTION FOR PEACE



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Send for circular giving specifications and data on auxiliary equipment, magnetic chuck, selectron, coolant unit, dust collector, etc.

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Baltimore	SA 5770	Dallas	R 6870	Houston	C 6500	Kansas City	BA 5057	Milwaukee	BR 5950	New York	BRG 6-1514	Philadelphia	WE 2310	Salt Lake City	3 9074
Birmingham	3 0582	Dayton	WE 2730	Indianapolis	LI 9957	Los Angeles	TR 3871	Minneapolis	GL 1173	Orlando	6856	Pittsburgh	AT 3305	San Francisco	GA 4784
Boston	ASP 6669	Denver	RE 7511									Providence	WI 1515	Seattle	EAST 7500
Buffalo	PA 6666	Detroit	TE 2 3960									Reading	7250	Statesville	510
Chicago	SEE 1160	El Paso	MAIN 7946									Rochester	CBL 174	Syracuse	3 7712
Cincinnati	MAIN 2929	Grand Rapids	B 0927									Rockford	MAIN 227	Toledo	AD 8477
Cleveland	EA 1177	Hartford	5 7290									St. Louis	CE 3621	Tulsa	4 4041

The DoALL Company Minneapolis 4 Minnesota

Telephone Your "DoALL" Sales and Service Store

NEED THESE DIE

ACCESSORIES?

Call "DETROIT"

● Our large stock of die accessories of all kinds assures prompt shipment.

Dowel pins in 163 standard sizes (plus oversizes) ground to exact diameters, carburized, hardened and tempered to case hardness Rockwell C. 60-62 effective to depth .020" and core hardness Rockwell C. 50-54.

Standard and Special die sets in all sizes.

CALL "DETROIT"

DETROIT	TR 2-5150
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SEATTLE	SE 2090
PORTLAND, Ore.	AT 1466
SAN FRANCISCO	MA 8532
BUFFALO	PA 9206
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ROCK ISLAND	R. I. 743

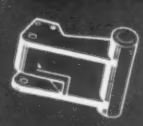
DETROIT DIE SET CORPORATION

2895 W. GRAND BLVD. DETROIT 2, MICH.

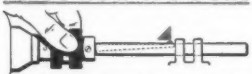
DETROIT DIE SETS ★

NOW!

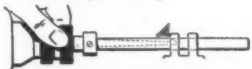
HERE'S HOW TO QUICKLY AND EASILY BURR HOLES ON PARTS LIKE THESE—



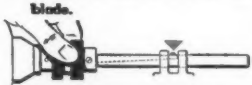
HERE'S HOW IT'S DONE



1 Insert Nobur tool in any machine spindle and deburr outside surface of work. Works like a drill—parts can be deburred as fast as they can be handled by the operator, with complete safety.



2 After outside surface is deburred, slide knurled sleeve back to retract blade.



3 Move work on over retracted blade and deburr inside surface. Double-edged cutting blade removes burrs around holes of single or multi-walled parts.

NO BUR TOOLS

Remove Burrs This Sure Way, Faster, Better, Easier!

With the New Nobur Tool you can burr faster – improve the finish of the deburred parts and lower production costs by eliminating burring as a bench operation. This New Nobur Tool speeds the burring of holes – and makes burring a fast, easy machine operation. It speeds production by cutting burring time to an absolute minimum.

The Nobur Tool works like a drill; it can be used in the spindle of any machine. The operator works with complete safety at all times and parts can be deburred as fast as they can be handled. All burrs are instantly removed – a double-edged cutting blade deburrs the edges of holes in flat or curved surfaces, of single or multi-walled parts, smoothly and accurately. The clean cutting action of the Nobur Tool will pass the most severe of inspections – it will help to eliminate reworks and repeats during assembly. Nobur Tool available in 1/16" progressive sizes from 3/16" to 1" in diameter. Write today for new complete burring folder.

NOBUR MANUFACTURING COMPANY

YOU'LL HAVE A LARGER GAGING SURFACE WITH THE NEW ROUND GAGES

ELLSTROM

When you use the new Ellstrom round gage blocks, practically all of the gaging surface can be utilized because there are no corners, as in the case of the square blocks. For example, the gaging area of a round block is .9970 square inch while the gaging area of a square block is .7917 square inch. Gage life is thereby increased.

Chromium plating increases gage life many times over ordinary steel gage blocks.

Use of the round shape gage virtually eliminates chances of tipping, causing possible injury to the gaging surface. "Flats" prevent rolling.

CHROMIUM PLATED

ROUND GAGE SETS PER SET	
Set No. 2-85-W	$464.00
Set No. 2-85-1	695.00
Set No. 2-81-W	437.50
Set No. 2-81-1	656.25
Set No. 2-35-W	222.50
Set No. 2-35-1	318.75
Set No. 2-36-W	259.35
Set No. 2-36-1	373.75
(Prices on individual blocks on request)	

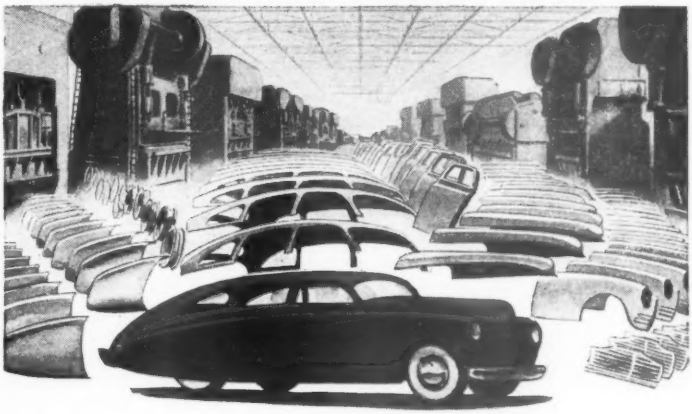
NOTICE

... We offer immediate delivery on rectangular gages.

DEARBORN GAGE CO. 22035 BEECH STREET DEARBORN, MICHIGAN

Originators of Chromium Plated Gage Blocks

MASS PRODUCTION FOR PEACE
will be Press Production



• In the streamlined conversion of American facilities to war products, stampings played a major part. In reconversion to civilian production they will play a similar part.

No other machine equals the Press for speed, quantity and accuracy of production. No other Die Set equals the *Danly Precision Die Set* for speeding Die-Making-Programs — and Press Production.

DANLY MACHINE SPECIALTIES, INC.
2100 S. 52nd Ave., Chicago 50, Ill.

DANLY *National Assembly*

Call Danly

- **MILWAUKEE 2** — 111 East Wisconsin
- **DETROIT 16** — 1549 Temple Avenue
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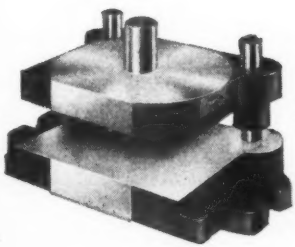
- **DAYTON 2** — 990 East Monument
- **ROCHESTER 4** — 16 Commercial Street
- **PHILADELPHIA 40** — 3858 Pulaski Avenue
- **LONG ISLAND CITY 1** — 47-28 37th Street
- **DUCOMMUN METALS & SUPPLY CO.** — 4890 South Alameda, Los Angeles



DIE MAKERS SUPPLIES

DANLY DIE SETS

Welded Steel Fabrication

Offices and Plant of The Adamant Tool Company, Bloomfield, New Jersey, upon the occasion of the Army-Navy "E" Award.

Offices and Plant Wheel Trueing Tool Company, Detroit, Michigan

Announcement

AS a further development of our policy of expanding and improving our services, facilities and resources, I am happy to announce that Wheel Trueing Tool Company has acquired the plant and equipment, name and goodwill of The Adamant Tool Company of Bloomfield, New Jersey.

The Adamant Tool Company has long been known to buyers of diamonds and diamond tools as one of the most progressive and competent organizations in this highly specialized field and it is therefore a pleasure for me to announce the union of the two companies.

Adamant recently acquired the consumer sales business of United States Industrial Diamond Corporation and will continue its service to the U.S.I.D. clientele as well as to the Adamant clientele.

All the well-known products of Wheel Trueing Tool Company will be available through the Adamant sales force which will thus supplement the Wheel Trueing sales force particularly in the Eastern Area.

This expansion of scope and resources makes Wheel Trueing Tool Company, more than ever before, one of the world's leading suppliers of diamonds and diamond tools.

Harry B. Wallace

PRESIDENT

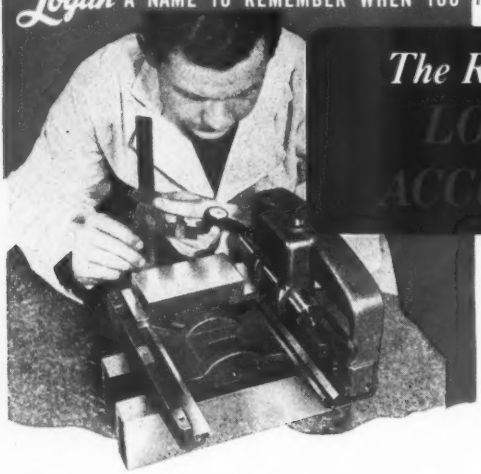
WHEEL TRUEING TOOL COMPANY

3200 WEST DAVISON AVENUE • DETROIT, MICHIGAN

WHEEL TRUEING TOOL COMPANY
OF CANADA, LIMITED
575 Langlois Avenue
WINDSOR, ONTARIO, CANADA

THE ADAMANT TOOL COMPANY
Eastern Division of Wheel Trueing Tool Company
657 Bloomfield Avenue
BLOOMFIELD, N. J.

Logan A NAME TO REMEMBER WHEN YOU THINK OF BETTER LATHES



The Reason for
LOGAN
ACCURACY

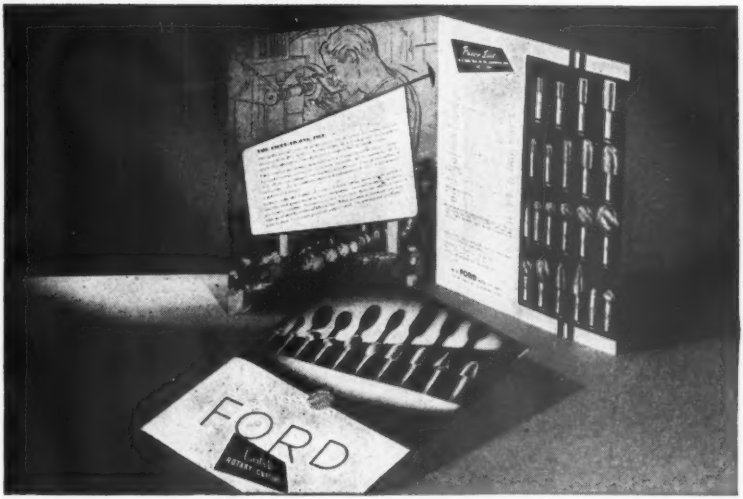
No. 850
Manufacturing
Turret Lathe

No. 825
Quick Change
Gear Cabinet Lathe

Accurate work comes from Logan Lathes because accurate work goes into building them. Typical of maximum tolerances allowed are Bed ways within .0005" of parallelism, and headstock bearing faces held to an accuracy of .0005". To maintain such accuracy in lathe after lathe, one of every seven men building Logan Lathes is an inspector, skilled in the use of precision instruments such as Comparators, Johannson Blocks, Sine Bars, and the most accurate of gauges. Using this precision equipment, Logan inspectors check individual parts, sub-assemblies, and completed machines. They make certain, in short, that every Logan Lathe will *work* accurately because every part of that lathe *fits* accurately. This Logan stress on inspection, though costly, is also the wisest economy. Lathes which pass such rigid inspection make friends of the men who use them. Ask your Logan Lathe dealer, or write for full information on all Logan Lathes.

SPECIFICATIONS common to all Logan Lathes: Swing over bed, 10½"; Bed width across ways, 6-15/16"; Bed length, 43⅛"; Size of hole through spindle, 25/32"; Spindle nose diameter and threads per inch, 1½"—8; 12 Spindle speeds . . 30 to 1450 r.p.m.; Size of motor . . ⅓ or ½ h.p., 1750 r.p.m.; Preloaded precision ball bearing spindle mounting; Drum type reversing motor switch and cord; Precision ground ways, 2 prismatic "V" ways, 2 flat ways.

LOGAN ENGINEERING CO.
CHICAGO 30, ILLINOIS D-2



New!

WRITE FOR YOUR COPY TODAY

The complete line of Ford Carbide Cutters is described and illustrated in this new 4-page bulletin. All standard styles and sizes are listed, as well as a selective few Carbide Specials which have been made to customer specifications.

Carbides enjoy the distinct advantages of faster cutting speeds, greatly increased tool life, with proportionately fewer regrinds, lower tool inventory, maximum production economy. In actual test they have been shown to outlast ordinary high speed steel by a ratio of fifty to one.

If you are interested in attaining these advantages, write for your copy today.

M. A. FORD MFG. CO., INC.
739 W. FIRST ST. • DAVENPORT, IOWA

HAND CUT FILES • GROUND FROM SOLID CUTTERS • CARBIDE CUTTERS

THREE ACES TO DRAW TO

If you've ever played poker (and who hasn't) how often has it been that you wished you could "go in" with a hand like this?

You can deal you a hand like this in your plant! *Knock-Out* Universal or Carbide Tool Grinders will prove to be the finest Aces anyone can deal you. They will pay their way and prove their worth many times over on tool maintenance or product production.

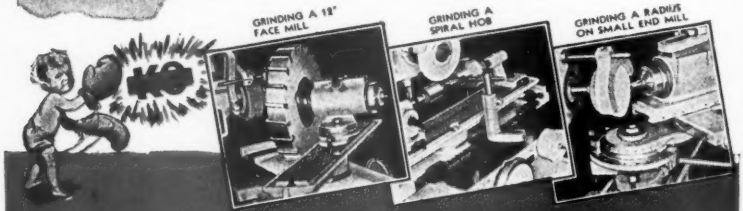
New and advanced features have given *Knock-Out* undisputed leadership in the Tool Grinder field. Versatility of operation and operator convenience have always been two prime factors in the minds of K-O Engineers. These, together with low initial cost and operation economy make K-O Grinders ACES—every one! Quick, easy setups on tools ranging from the smallest size to cutters twelve inches in diameter are made possible with K-O designed fixtures and accessories.

Correct machine design has placed operating parts where they will function with maximum performance and operator convenience. K-O Engineers have made available more time-tested fixtures and accessories than has any other tool grinder manufacturer, thus making K-O Tool Grinders truly universal. Single-speed or Multiple-speed motor heads are available. The K-O SPEED HEAD permits the operator nine speeds from which to select for the job at hand. These speeds range from 1,100 to 11,000 R.P.M.

Knock-Out Universal Tool Grinders are built to accommodate most any high-speed steel cutters as well as carbide tip tools. K-O Carbide Tool Grinders are built to handle all grinding and sharpening operations necessary on single point carbide tip tools or, if desired, for grinding chip breakers only.

Thinking men are now planning for reconversion. Let us tell you how to include these "three Aces" in your plans.

See your nearest *Knock-Out* Distributor or write now for catalogue No. 36-95



If it's made by Lee—it's a Knock-Out!

SEE YOUR NEAREST DISTRIBUTOR OR WRITE DIRECT TO

K. O. LEE CO. ABERDEEN, SO. DAK.

GAGES OF PRECISION BY WOODWORTH

ALL the facilities of the N. A. Woodworth Company are directed to one objective . . . the manufacturing of precision gages and tools with the longest accurate life to give the user the lowest possible operating cost.

Increase your production efficiency with sustained accuracy by Woodworth.

★ ★ ★

1 Speed up production and reduce costs with the Limitrol. The Limitrol Comparator Type Snap Gage checks errors involving pitch diameter, lead, taper, angle, out-of-roundness. It eliminates "feel" and reduces scrap. Write for Folder 44-L.

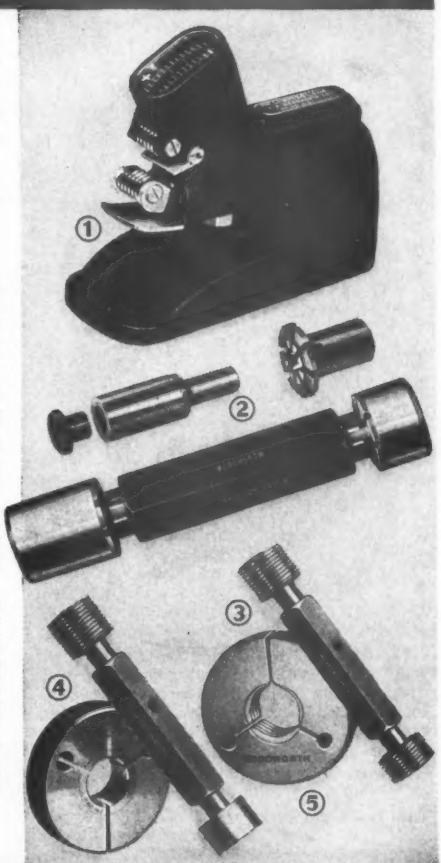
2 Woodworth Carboloy Gages are free from distortions, stresses and strains. Woodworth's exclusive segmented shank compensates for the differences in coefficient of expansion between cemented carbides and steel, thus assuring a trouble-free bond between these two materials. Write for Circular 44-C.

3 Woodworth Durplate Gages are noted for their long life and great accuracy. The Durplate process is exclusively a Woodworth development and confirms the Woodworth slogan, "accuracy you can trust."

4 Woodworth gages of cast Stellite alloy are tough, high wear-resistant . . . have a service life many times that of steel. Gage life is increased from 10 to 20 times. Stellite Cast Alloy Gages are non-corrodible and non-magnetic . . . have a coefficient of expansion close to steel . . . with other desirable characteristics. Write for Folder 44-S.

5 Gages of Nawlide, a specially processed Woodworth alloy, are outwearing ordinary steel gages many times with no sacrifice in toughness.

ACCURACY YOU W *CAN TRUST*



WOODWORTH

N. A. WOODWORTH CO., SALES DIVISION, 1300 E. NINE MILE ROAD DETROIT 20, MICHIGAN

PRECISION GAGES • PRECISION MACHINED PARTS • PRECISION TOOLS

"HARDSTEEL"

Tool Bits

DOUBLE SPEED of turning SAE 4130 hex bolts and MULTIPLY BY 16 the output between grinds

● Another tough production problem solved by "HARDSTEEL"! To make the bolt illustrated, 7/8" hex stock had to be turned to 5/8" diameter round. The inherent toughness of the SAE 4130 steel plus an intermittent cut at the start of the turning operation gave low production—with tools of high speed steel. And the tool had to be re-ground every 2½ hrs.

When the manufacturer switched to "HARDSTEEL" tool bits, ground with 7° clearance angle, 9° back rake and 10° side rake, speed and feed were stepped-up, cutting turning time in half. Production was further increased because the "HARDSTEEL" tools held their edge and required re-grinding only once every 20 hours!

Write for your copy of the "HARDSTEEL" Operator's Manual.

"HARDSTEEL" Drills, Tool Bits and Special Tools are solving many production problems—among them drilling hardened steels and machining tough, hard steels and abrasive alloys.

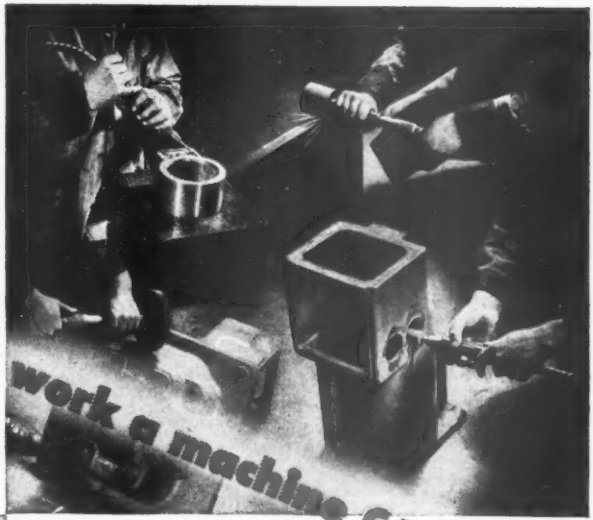
Also inquire about "HARDSTEEL" as a metal for special parts that must meet unusual conditions of service.

"HARDSTEEL"

DRILLS • TOOL BITS • SPECIALS

BLACK DRILL CO. • Division of Black Industries • 5000 E. 222nd St., Cleveland 17, Ohio

SAVE THESE FOR WORK A MACHINE CAN'T DO



Here is work a machine CAN do

HC—3—½ H.P., multi-speed countershaft unit, 900 to 3600 R.P.M. Mounted bench-height on 3-leg caster base, 360° swivel.

Grinding—Sanding—Rotary filing—Wire brushing—Buffing and Polishing—all are machine operations. There are many more.

All can be done better and faster, with a greater degree of efficiency, by using a Haskins Flexible Shaft Machine. And this with much less strain and fatigue on the part of the operator.

Write for Catalog 45, showing many ways to speed production with flexible shaft equipment. And remember—save your hands for work a machine *can't* do.

R. G. HASKINS CO.
625 South California Ave., Chicago 12

HASKINS

haskins
FLEXIBLE SHAFT EQUIPMENT

The JIGMIL has proven to be a totally new approach to the problems of economical precision BORING and milling of tool and production work

THE fastest producing and most accurate machine in the field.

Many users are reporting consistent experience of two to three times the output and higher quality work.

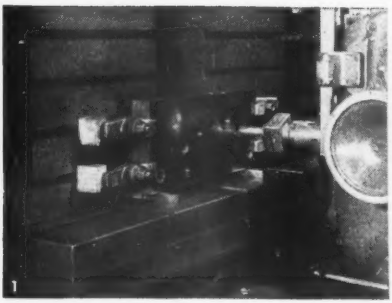
Automatic positioning of spindle from one location to another in response to measuring rods and push buttons to within less than .0001 (one ten-thousandth part of an inch).

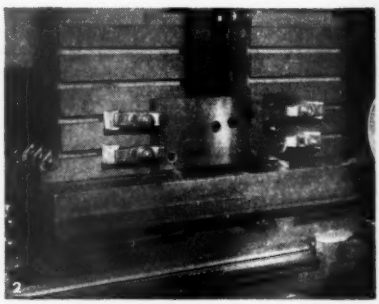
Feather touch, pressure controlled slide locks that positively control locking uniformity, so essential to high precision work.

Unique operation and controls that make possible high precision work with relatively little skill.

JIGMIL—The world's finest BORING and milling machine is made in Detroit.

★ ★ ★





★ No. 1—Illustration showing convenience of jig plate boring. No. 2—Eight holes precision bored. Holes spaced within .0001 with total dependence of all spacing on automatic positioning means.

DeVLIEG MACHINE COMPANY DEVLIEG JIGMIL **450 FAIR AVE.** FERNDALE 20, (Detroit) MICH.

HOW TO RELOCATE AND FINISH GRIND HOLES TO .0001" IN 1/3 THE TIME

NO LONGER is it necessary for toolmakers to labor over buttons and locating plugs to correct holes in hardened parts... not if you use the Moore Jig Grinder.

You can rely entirely on this unique machine to *mechanically* relocate and finish-grind straight or tapered holes to exact size and location in ½ to ¼ the time required by conventional methods.

Accurate lead screws built into the Jig Grinder enable operators to guide the work rapidly to precise location within .0001" at the turn of the micrometer dials. This eliminates hours of checking on the bench and surface plate.

Working *to figures instead of to "fit,"* the Moore Jig Grinder takes die-making out of the "one-man" class and puts it on an interchangeable parts and assembly basis for the first time. Die, stripper and punch plates can now be produced concurrently with better alignment of mating parts and more uniform clearance between punch and die. Multi-section dies are quickly ground in *a single set-up*... eliminating separate-section hole grinding and the accompanying problems of accurately locating each section in the die bed.

MOORE SPECIAL TOOL CO., INC.
726 UNION AVENUE, BRIDGEPORT 7, CONN.

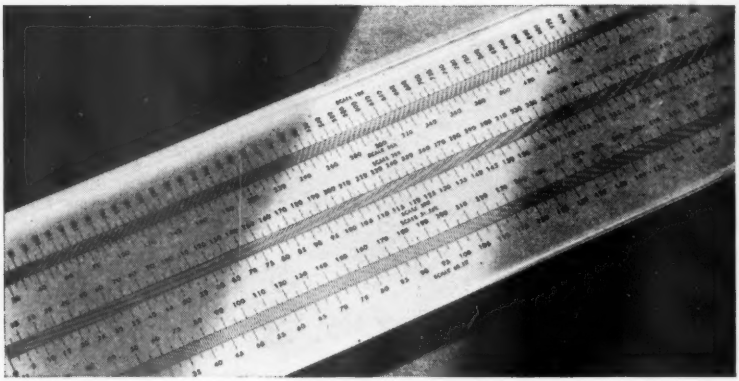
NEW 72-PAGE CATALOG describes Moore Jig Grinder's application to dies, drill jigs, gage parts, master plates and production parts.

MOORE TOOLS

Moore Jig Grinder

THE ONLY MACHINE OF ITS KIND

New! SIX MAGNIFICATIONS *on One Scale*



This newcomer to the familiar line of Projector Rules and Scales has been named the "All Magnification Projector Scale," as it carries all the standard magnifications usually employed in the lens systems of optical comparators. These Scales are precise and remain so, for they are on specially ground glass. Convenient cushioned handles and velvet-lined hardwood storage cases virtually assure their security. It is doing a good job for a number of precision manufacturers.

In addition, the Engineers Specialties line includes such well-known items as American National Form and British Standard Whitworth Screw-Thread Charts; Detail Engineers'-Glass, Translucent, and Scribing Engineers'-Glass; Radius, Grid and Protractor Charts. Special Charts can be made to almost any desired specifications.

Literature and prices will be sent upon request.

ENGINEERS SPECIALTIES DIVISION

The UNIVERSAL ENGRAVING & COLORPLATE COMPANY, INC.

980 ELLICOTT STREET
BUFFALO 8, NEW YORK

TWIN PLANTS

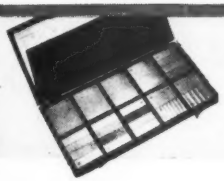
1919 EAST 19th STREET
CLEVELAND 15, OHIO

Aid inspection with "three-dimensional" vision

For the most critical inspection at high magnification of small parts, contours, surfaces, use THREE-DIMENSIONAL VISION as provided by the Spencer Binocular Microscope. It reveals surface scratches, or markings, characteristics of metallurgical structure, and minute imperfections which are beyond the reach of ordinary magnified inspection.

Choice of objectives: .7x, 1x, 2x, 3x, 6x
Choice of eyepieces: 9x, 12x, 15x, 18x
Price, Model 26 with case, $123.50

The Universal Microscope Lamp (shown above) throws a concentrated small-area beam of light upon the object. Angle of the light beam can be changed at will to throw into relief any part of the object. Complete, with transformer for 110V., A.C., $23.50



SURFACE FINISH STANDARDS

This set of G-E Standards when used with the Spencer Binocular Microscope standardizes various degrees of finish, enables selection of the proper finish, and supplies a comparison standard for the finished surface in production. Complete set includes 10 specimens, each marked in accordance with accompanying reference chart.

Set, $40.00

GEO. SCHERR CO., Inc. 200-8 LAFAYETTE STREET NEW YORK 12, N. Y.

AMMCO 7" SHAPER

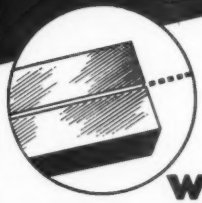
A precision machine for precision work . . .

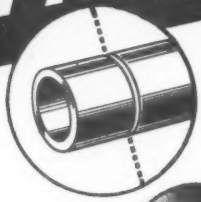
Phenomenal performance of this precision shaper in war production work is an indication of its great value in the postwar period when your competitive conditions put added importance on accuracy and low-cost production . . . The precise accuracy of work turned out on an Ammco 7" Shaper assures precision production unsurpassed by larger machines selling for hundreds of dollars more than the Ammco . . . In addition to low initial cost, you also effect big savings in time and expense on set-up operations . . . You save on electrical power consumption . . . You save on floor space—all without sacrificing quality or accuracy . . . Available for bench installation, or as a portable unit.

Write today for specifications and prices

AMMCO 2100 COMMONWEALTH AVENUE
NORTH CHICAGO, ILLINOIS

E-A-S-Y CUTTING





with MILFORD DUPLEX HACK SAW BLADES

For straight line cutting . . . in corners or angles . . . or in tubing . . . MILFORD DUPLEX with EASY-STARTING TEETH are the answer.

There's no delay and spoilage from poor starts. With MILFORD . . . it's one push and the cut is started on the line. Even with tubing, you get easy, smooth cutting . . . no hanging up or binding in the side walls.

This Duplex feature is but one of the outstanding reasons for cutting superiority built into MILFORD HACK SAW BLADES in over sixty-five years of exclusive saw manufacturing.

Order from your Mill Supply Distributor

Available in two types of REZISTOR High Speed Steel hand blades . . . all hard for skilled mechanics . . . flexible for the less skilled to eliminate breakage, and for safety.

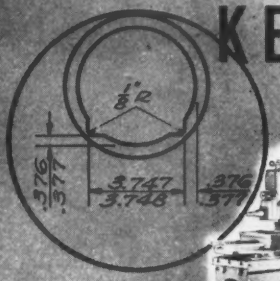
MILFORD

PROFILE AND BAND SAW BLADES
REZISTOR AND DUPLEX HACK SAW BLADES

THE HENRY G. THOMPSON & SON CO.

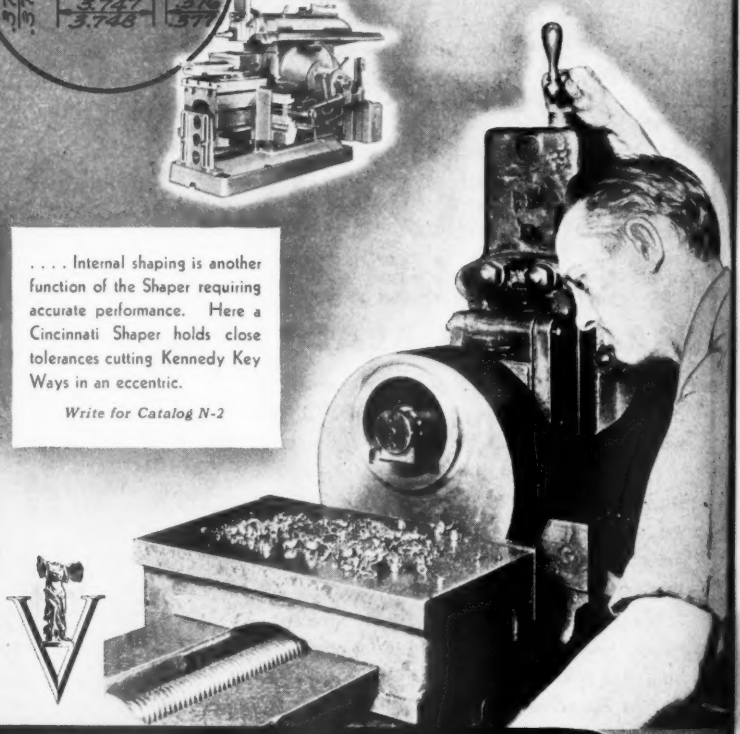
Saw Specialists Exclusively for Over 65 Years
NEW HAVEN 5, CONNECTICUT U. S. A.

KEY WAYS
...the right way!



. . . . Internal shaping is another function of the Shaper requiring accurate performance. Here a Cincinnati Shaper holds close tolerances cutting Kennedy Key Ways in an eccentric.

Write for Catalog N-2

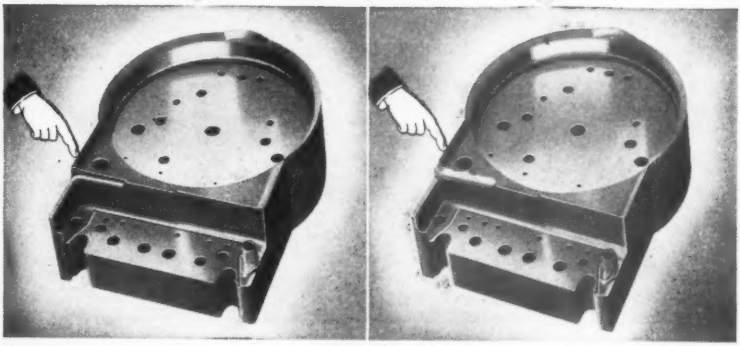


THE CINCINNATI SHAPER CO.

CINCINNATI OHIO U.S.A.

SHAPERS · SHEARS · BRAKES

Eureka Tool Steel Welding Saves Pre-War Dies . . .



Design of costly mold die changed by welding with Eureka Tool Steel Welding Electrodes

Quick Die Changes Speed Reconversion

In order to meet the huge civilian demand as quickly as possible, most manufacturers are planning on promoting pre-war items . . . using pre-war dies.

Invariably, however, *some* die changes are exceedingly practical and in many cases essential, and these changes can be quickly made by tool steel welding. Dies used for blanking, forming, forging, drawing, embossing, coining, hot and cold trimming, and in fact dies for practically every purpose can be welded with Eureka Tool Steel Welding Electrodes. *It is not necessary to make new dies* . . . Write today for the complete story.

EUREKA TOOL STEEL ELECTRODES

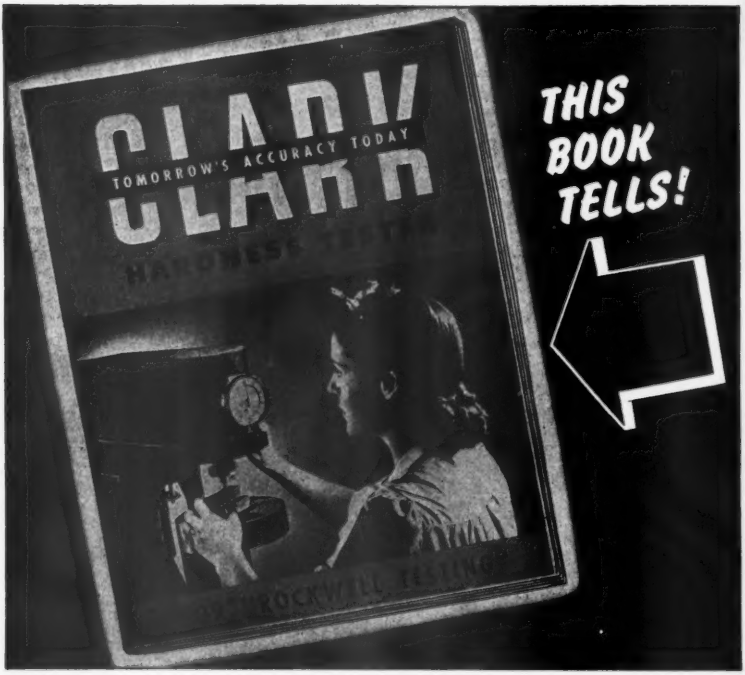
Welding Equipment & Supply Co.

PIONEERS IN TOOL AND DIE WELDING ELECTRODES

223 LEIB STREET • FITZROY 3715 • DETROIT 7, MICHIGAN

DO YOU KNOW THE TRUTH

About Hardness Testing?



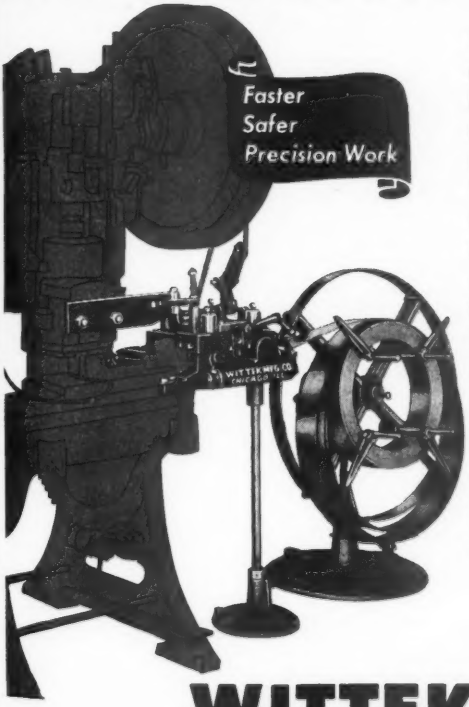
The new Clark catalog is more than a catalog.

It is a 20-page reference manual on the history, theory, practice, and equipment for modern, scientific hardness testing. Printed in two colors, 8½″ x 11″, it is available without charge to manufacturing executives. Just drop a line on your letterhead to Department TD, CLARK INSTRUMENT INC., 10200 Ford Road, Dearborn, Mich.

CLARK
TOMORROW'S ACCURACY TODAY
HARDNESS TESTER

Planning Peacetime Production Using Coiled Strip Stock?

Equip with
WITTEK
Automatic Roll Feeds and Reel Stands



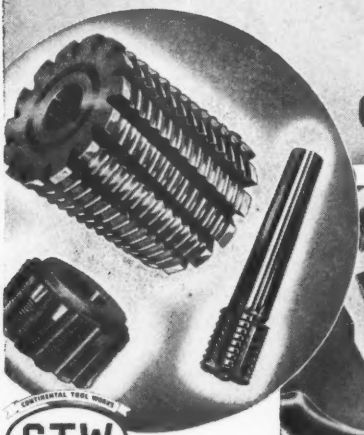
Wittek Roll Feeds are being used extensively by war plants in their large volume production of high quality metal stampings. The flexibility of Wittek Roll Feeds will assist these plants in their peacetime conversion through their adaptability to various jobs. Keen competition will demand the utilization of equipment to its point of highest efficiency. If your postwar plans include punch press production of parts from coiled strip stock—investigate now the many possibilities of Wittek Roll Feeds and Reel Stands.

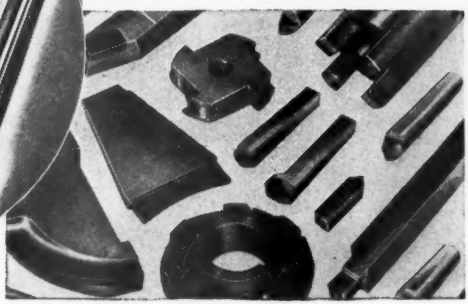
Write for catalog, prices and recommendations

WITTEK
MANUFACTURING CO.
4305-15 W. 24th Place, Chicago 23, Ill.

Automatic
ROLL FEEDS
AND
REEL STANDS

Check CONTINENTAL for Precision CUTTING TOOLS





CTW

Since 1919 The Continental Tool Works (a division of Ex-Cell-O Corporation) has been producing special and semi-standard cutting tools to customers' drawings or part prints—until today the Continental name in the cutting tool field is commonly used as another word for "accuracy and quality." This long experience, coupled with the most modern and complete facilities, makes Continental the first choice as a cutting tool source. *Find out now how Continental can help assure you of high production efficiency*—get in touch with your nearest Ex-Cell-O representative or write direct.

CONTINENTAL TOOL WORKS

DIVISION OF EX-CELL-O CORPORATION

DETROIT 6, MICHIGAN

45-23

EX-CELL-O *makes* Special Multiple Way-Type Precision Boring Machines • Special Multiple Precision Drilling Machines • Precision Thread Grinding, Boring and Lapping Machines Broaches and Broach Sharpening Machines • Hydraulic Power Units • Grinding Spindles • Drill Jig Bushings • Continental Cutting Tools • Tool Grinders • Fuel Injection Equipment • R. R. Pins and Bushings • Pure-Pak Paper Milk Bottle Machines • Aircraft and Miscellaneous Production Parts

Cut costs...save time with T-J RIVITOR

AUTOMOBILES

FARM MACHINERY

LAWN MOWERS

TOYS

KITCHEN UTENSILS

STOVES

STAMPINGS

REFRIGERATORS

HARDWARE ITEMS

WASHING MACHINES

...and many other uses!

Automatically

FEEDS AND SETS SOLID RIVETS

Bring production-line speed and efficiency to your riveting and assembly operations —with the T-J RIVITOR! Automatically feeds and sets solid steel rivets $\frac{1}{16}$" to $\frac{1}{4}$" dia. incl., and up to $\frac{7}{8}$" incl. long. Assures a completely filled hole... no flashing... a neat, balanced head. Makes a solid rivet joint of 10% to 15% greater strength. Rugged, dependable. Write for bulletin 544. The Tomkins-Johnson Co., 620 Mechanic Street, Jackson, Michigan.

28 YEARS EXPERIENCE...

TOMKINS-JOHNSON
RIVITORS
T-J

South Bend Lathes

16" x 6' SOUTH BEND TOOLROOM LATHE

Built to High Standards of Precision

Throughout the process of manufacture, parts and units for South Bend Lathes are frequently inspected to assure accuracy in the finished product. Hundreds of precision gauges, special measuring devices, and instruments are used. Final tests are made with the lathe in operation. Each lathe must machine work to extremely close tolerances before it is approved for shipment from our factory.

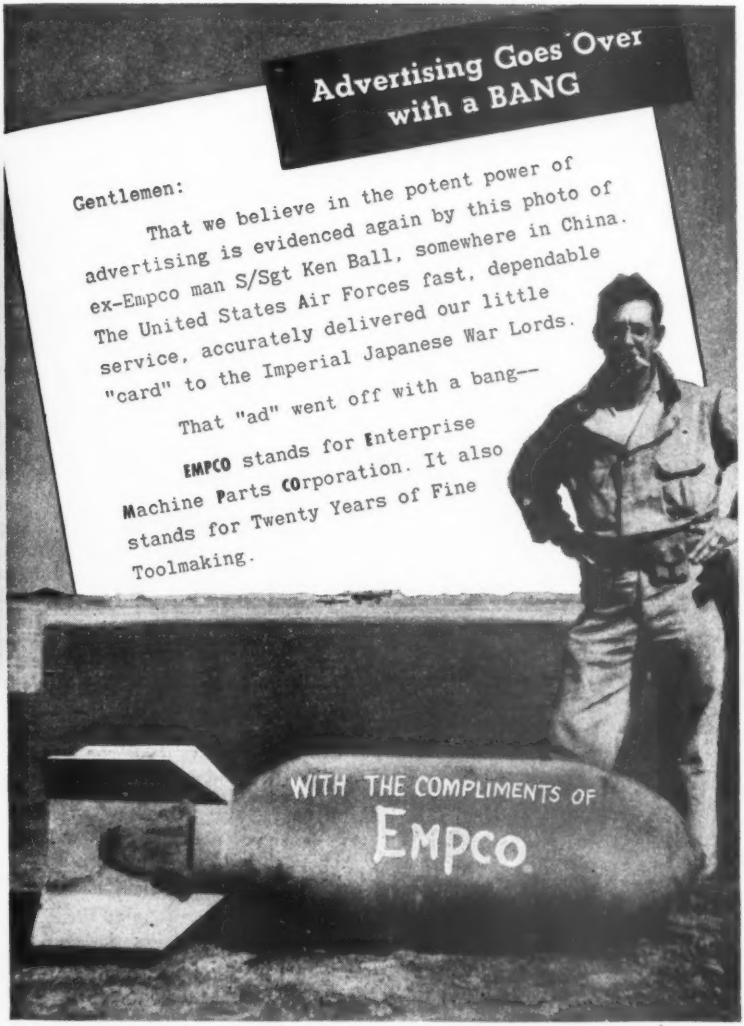
Because these quality controls give them dependable precision, South Bend Lathes have long been favorites in the toolroom. For this same reason, plus a fatigueless ease of operation, they are equally popular for manufacturing operations.

WRITE FOR NEW CATALOG 100-D

Illustrates in full-color and describes South Bend Engine Lathes and Toolroom Lathes with 9", 10", 13", 14½", and 16" swings. Also, Precision Turret Lathes with ½" and 1" collet capacities.

SOUTH BEND LATHE WORKS

432 EAST MADISON STREET, SOUTH BEND 22, INDIANA • *LATHE BUILDERS FOR 38 YEARS*


Advertising Goes Over with a BANG
Gentlemen:
That we believe in the potent power of advertising is evidenced again by this photo of ex-Empco man S/Sgt Ken Ball, somewhere in China. The United States Air Forces fast, dependable service, accurately delivered our little "card" to the Imperial Japanese War Lords.
That "ad" went off with a bang—
EMPCO stands for Enterprise Machine Parts COrporation. It also stands for Twenty Years of Fine Toolmaking.
WITH THE COMPLIMENTS OF
EMPCO

Manufacturers of: Machine Parts, Tools, Jigs and Fixtures, Special Machinery.
Designers and Builders of: EMPCO Horizontal Honing Machine—EMPCO Hydraulic Units.
Originators and Distributors of: The popular Machine leveling device, EMPCO JACKS—to set and KEEP equipment LEVEL.
J. P. A. Bellefleur, Secretary and General Sales Engineer.

EMPCO

THE ENTERPRISE MACHINE PARTS CORPORATION

2735 JEROME AVE. DETROIT 12, MICH.

Cut your gaging costs . . .
USE PERFEX CARBOLOY GAGES!

Special Carboloy Gages and tools made to your specifications.

We are pleased to announce that the *Carboloy Company* has granted us a franchise to use carboloy in the manufacture of our gages.

We consider this as another big step forward in our continual efforts to offer the highest quality, longest wearing gage possible to produce.

LOOK AT THESE ADVANTAGES!

1. Gaging costs per piece is reduced.
2. Users report 15 to 20 times longer wear.
3. Lower inventories required.
4. Routine gage inspections can be greatly reduced.

Write for prices and delivery dates today

PERFEX GAGE & TOOL COMPANY
3604 GAYLORD AVENUE DETROIT 12, MICHIGAN

ACCURACY PERFEX OUR CREED

Save production time with a SHOPLIFTER

- **Light, Compact**
- **Easily Moved About**
- **One-Man Operated**
- **Wide Range in Application**
- **Saves Production Time**

  In handling dies and heavy fixtures; stacking barrels, boxes, etc.; loading and unloading trucks

Specifications

Type—D
Capacity—500 lbs.
Overall height—72"
Platform lift—54" above floor level, lowers to within 5" of floor
Baseframe—24" wide x 33" long
Platform—24" x 24", steel plate
Entire frame of machine of structural steel, electrically arc welded throughout
Basewheels—4" diameter, iron wheels
Crank up and down hoist unit
Two swivel casters and two stationary wheels with push bar furnished
Painted olive green finish
Weight—250 lbs. (approx.)

Heavier capacities up to 5,000 lbs. also available. Write for details.

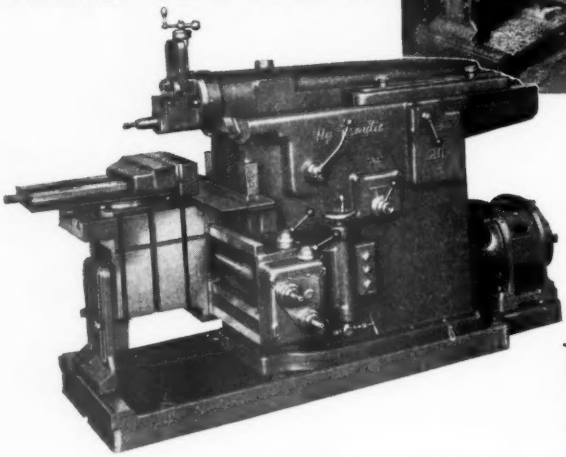
Prompt Delivery . . . Price $147.50. Full freight allowed

Foot Operated Floor Lock—$10.00 extra

ECONOMY ENGINEERING CO., 2659 W. Van Buren St., Chicago 12, Illinois

You Couldn't Beat that Baby"

SAID PAUL AT S & B TOOL CO.



BUY UNITED STATES WAR BONDS AND STAMPS

The "baby" is one of the Hy-Draulic Shapers in the plant of the S & B Tool Co. where Paul is foreman. By way of proof, Paul put the Hy-Draulic Shaper through its paces for the visitors and their camera. Easy set up was demonstrated by use of centralized controls, rapid traverses; quick, easy establishment of desired cutting speed and feed, setting ram-stroke length and position in one simple manual operation with hardly a pause in its movement. In less time than it takes to describe, chips rolled off the job and Paul stood at ease ready for the next operation. In shops like this, where fine work is put out around the clock seven days a week steadily month after month, the easy, fast operation, accuracy and stamina of Hy-Draulic Shapers pay off in high production and economy of effort. For present and future tool and die work, maintenance or production operations that include shaping — buy Hy-Draulic Shapers. Write to us today, for Bulletin 2510.

4411

ROCKFORD MACHINE TOOL CO., ROCKFORD, ILLINOIS

MASTER WORKMANSHIP

Our experience as Army and Navy materiel tool and gage makers will be incalculably valuable to manufacturers when their conversion to peacetime production requires prompt delivery of dependably accurate Gages, Jigs, Fixtures and other Special Precision Tools. We also specialize in Standard Plug, Ring and Thread Gages. Our inspection meets the most exacting specifications.

BUILDERS OF PRECISION TOOLS — GAGES • • JIGS • • FIXTURES

TOOLS *and* GAGES

INCORPORATED

3112 EAST 63rd STREET • CLEVELAND 4, OHIO

MICHIGAN 7230

A New Precision Holder for Better Reaming

Here is a reamer holder built by reamer specialists, to bring to your turret lathes and screw machines, the full precision qualities inherent in L & I Ground Flute Reamers.

The L & I Precision Centering Reamer Holder establishes a new center absolutely true with the spindle axis, and drives the reamer from this dead center. *Reamer does not float* — but follows true centerline free from weight or pressure. No bushings — no bell-mouthing — no tapered holes — corrects diagonal errors in turrets.

Standard model holds reamers from 1/16″ to 7/16″ diameter interchangeably. Larger model for reamers 7/16″ to 1⅛″ diameter.

Write for bulletin giving full specifications and prices.

LAVALLEE & IDE, INC. • CHICOPEE, MASS.

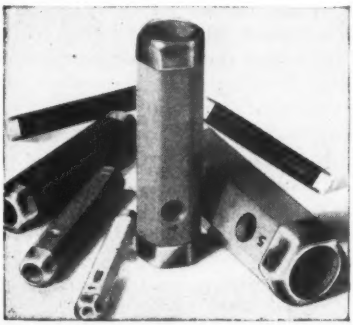
L&I GROUND FLUTE REAMERS

FEDERAL

Taperlock Plastic

GAGE HANDLES

Made of durable plastic material, one-third lighter than aluminum. This lightness permits a most sensitive "touch" with less fatigue . . . an advantage appreciated by women inspectors.



Federal Taperlock Plastic Gage Handles have proved very satisfactory for glass gages. Being so much lighter than metal handles, the danger of chipping and breaking is greatly reduced.

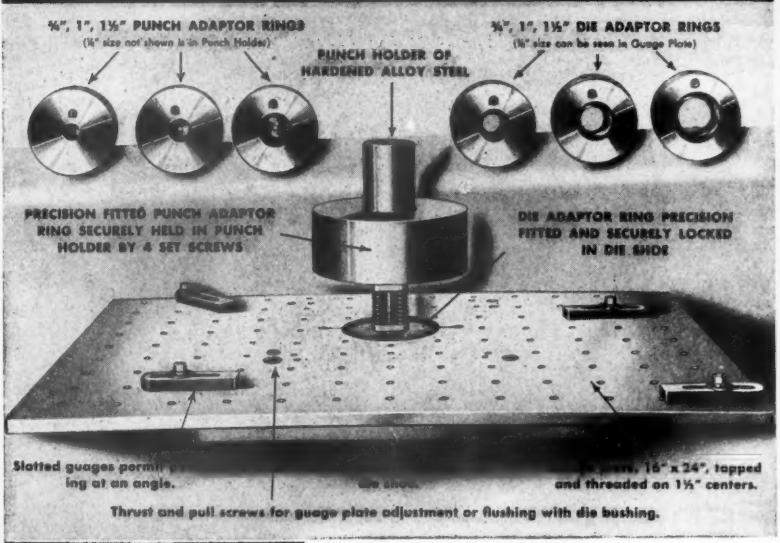
Plastic Handles insulate, protecting gages from bodily heat which might affect accuracy.

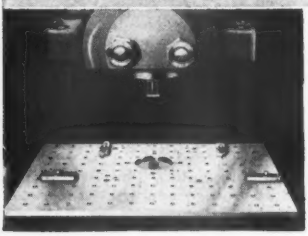
Easily marked for identification with the same tools used for marking metal handles. Available in SEVEN sizes—00 for small gages, 1, 2, 3, 4 and 5. In FOUR colors — Red, Green, Yellow and Black.

IMMEDIATE DELIVERY
On Rated Orders

FEDERAL TOOL CORPORATION
400 NORTH LEAVITT STREET CHICAGO 12, ILLINOIS

WHISTLER SINGLE HOLE PERFORATOR


⅝", 1", 1⅛" PUNCH ADAPTOR RINGS
(⅛" size not shown in Punch Holder)
PUNCH HOLDER OF HARDENED ALLOY STEEL
⅝", 1", 1⅛" DIE ADAPTOR RINGS
(⅛" size can be seen in Guage Plate)
PRECISION FITTED PUNCH ADAPTOR RING SECURELY HELD IN PUNCH HOLDER BY 4 SET SCREWS
DIE ADAPTOR RING PRECISION FITTED AND SECURELY LOCKED IN DIE SHOE
Slotted guages permit
and threaded on 1⅛" centers.
Thrust and pull screws for guage plate adjustment or flushing with die bushing.



Shown above is the U-5015 Whistler Single Hole Perforator Set complete and at the left, the set on the press ready for production—the answer to quick and economical handling of many perforating jobs. It takes but a few minutes to bolt in the punch holder and position the guage plate and die shoe which are set on the press as a single unit. Punch and die adaptor rings of the four sizes are changed instantly by loosening then tightening two set screws. The same procedure is followed for changing sizes of punches and dies. Absolute precision is assured. Punches, dies and strippers are extra. Shipped within a few days in standard sizes from ½" to 1½" in round, square, oval and rectangle shapes for perforating materials to ¼" thick mild steel. Operating satisfaction is guaranteed by Whistler's 28 years of experience in the manufacturing of production perforating equipment. Whistler Single Hole Perforator Unit complete F. O. B. Buffalo **$465**

S. B. WHISTLER & SONS, Inc. 752-756 Military Road, Buffalo 17, N. Y.
REPRESENTATIVES IN ALL PRINCIPAL CITIES

Get in touch with **WHISTLER** *for all types of sheet metal dies!*

HARGRAVE Chisels and Punches *Individually* TESTED

Cold Chisel

Half-Round Chisel

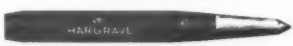
Cape Chisel

Diamond Point Chisel

Round Nose Chisel

Prick Punch

Center Punch



Solid Punch

Pin Punch

Pin Punch

Individually Tested

for **Hardness, Toughness and Freedom from Flaws**

All Hargrave Chisels and Punches are trip-hammer forged (not drop forged) from our special analysis steel. Each tool is *individually tested* to insure longer life and superior performance.

WRITE FOR CATALOG showing the complete line of Hargrave Clamps, Chisels, Punches, Brace Wrenches, File Cleaners, Washer Cutters, etc.

THERE IS AN INDUSTRIAL DISTRIBUTOR STOCK NEAR YOU

The CINCINNATI TOOL *Co.*

1964 Waverly Avenue **Cincinnati 12, Ohio**

SHELDON

S-56 LATHE

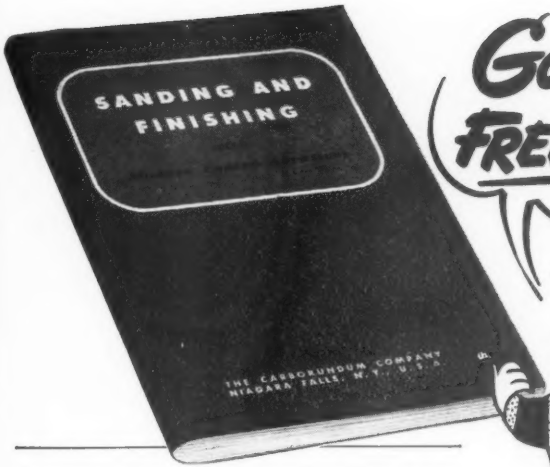
- Heavy bronze bearings
- 1" Collet capacity
- 11¼-inch swing
- Double-walled apron
- Large hardened and ground spindle
- Extreme accuracy
- Convenient controls
- Underneath V-belt motor drive
- All Steel Bench

. . . compare a SHELDON S-56 Precision lathe with all other 10" lathes in the moderate priced field, and you'll find more accuracy, more capacity, more convenience, more design, more quality . . . **from any angle just more lathe.**

The SHELDON S-56 lathe has a bed length of 56", with rigid T-girted bed with 2 V-ways and 2 Flat ways which are ground and hand scraped to .0005" of both lateral and parallel alignment. Lead screws are cut on the finest Pratt & Whitney "super precision" lead screw machine. The S-56 lathe with 56" bed is mounted on a rigid 5 drawer steel bench (S-44 with 44" bed on a 4 drawer steel bench) which houses an efficient 4-speed (8 spindle speed) underneath motor drive. Each comes with full quick-change gears, power longitudinal and cross feeds and standard big lathe features.

SHELDON MACHINE CO., INC.
4236 N. Knox Avenue Chicago 41, U.S.A.

Builders of Good Lathes Since 1919



AVAILABLE TO ALL BONA FIDE MANUFACTURING PLANTS TELLS HOW EASY IT IS TO IDENTIFY, SPECIFY AND ORDER COATED ABRASIVES BY "CARBORUNDUM"

IT illustrates the markings for Coated Abrasives by "CARBORUNDUM." How these products are easily *identified* by end use... *clearly marked* with the specifications on both package labels and backing material... *easy to order* because you know exactly what you are using.

In addition this new book gives you information you will find helpful concerning Coated Abrasives by "CARBORUNDUM" and their wide range of uses. If you have not yet received your copy, be sure to write us today. The Carborundum Company, Niagara Falls, New York.

ABRASIVE TOOLS FOR METALWORKING

METAL CLOTH... SANDER DISCS... INDUSTRIAL CLOTH... POLISHING PAPER ... CROCUS CLOTH ... WATERPROOF PAPER ... SLEEVES ... CARTRIDGE ROLLS ... SLOTTED DISCS ... CLOTH DISCS ... CONES ... CRANKSHAFT ROLLS... "ECONOMY" ROLLS ... EMERY CLOTH ... INDUSTRIAL CLOTH BELTS

HERE'S WHAT'S IN IT!

1. Sanding and Finishing Processes.
2. Abrasive Grains.
3. Classification of Grain Sizes.
4. Bonding Materials.
5. Coatings.
6. Backing Materials.
7. Flexing.
8. Suggestions for stocking.
9. How to identify and specify Coated Abrasive Products by "CARBORUNDUM."
10. Recommendations for Belt Splices.
11. Machine specifications for Belt Sanding.
12. Specifications for Standard Coated Abrasive Products.

THERE IS A PRODUCT BY
CARBORUNDUM
TRADE MARK
FOR EVERY ABRASIVE APPLICATION

("CARBORUNDUM" is a registered trade mark of and indicates manufacture by The Carborundum Company)

ABRASIVE M-34

VERTICAL SPINDLE SURFACE GRINDER

HEAVY POWERFUL ACCURATE

Centuries ago when metal working was a matter of personal skill and craftsmanship, the medieval knight staked his life on the ability of his armorer. Today you can safely stake your production on the metal working ability and accuracy of ABRASIVE *Surface Grinders.*

Massively constructed with motorized spindle, the Abrasive M-34 delivers maximum power at the cutting point . . . takes unusually heavy cuts with excellent finish. Table feed is automatic in either direction and of ample speed; length of stroke is positively controlled by adjustable dogs. Automatic down feed provided. The M-34 is reliable, accurate . . . easy to operate, adjust or repair. It grinds to close tolerances *immediately* upon starting and maintains these tolerances throughout production runs.

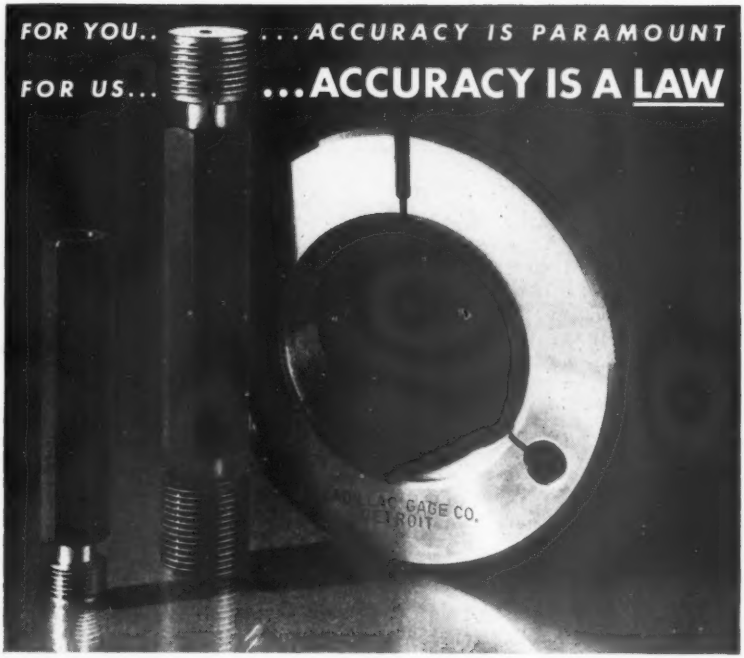
Ask for descriptive bulletin.

If you will send us the serial numbers, we will gladly supply any information in our files regarding ABRASIVE Machines on the U. S. Gov. surplus machine tool list, and will endeavor to furnish attachments, accessories and repair parts as required.

ABRASIVE

ACCURACY BOOSTS PRODUCTION

ABRASIVE MACHINE TOOL COMPANY • EAST PROVIDENCE 14, RHODE ISLAND



CADILLAC Gage accuracy pays you dividends . . . in faster, easier assembly, in less "rejects" and "scrap." You get more O.K.'d pieces per run . . . more quality production at less cost—more *PROFIT!*

Cadillac maintains the highest standards of gage making art throughout the entire manufacturing process of jewel-like ring and plug gages. From the first inspection of the raw stock until the gages have passed the highest standards of final inspection . . . accuracy is in truth a law.

10,000 Cadillac Gages in standard sizes are in stock . . . for fast delivery. Just PHONE us your requirements and we'll ship at once.

Try Cadillac Gages and watch your standards of accuracy mount.

PHONE US—*REVERSE THE CHARGES!*

Your inquiries are welcome. Phone us regarding any gage problem. Reverse the charges.

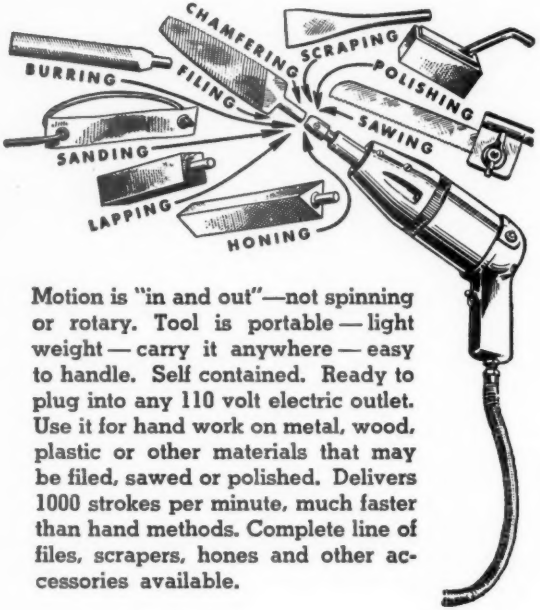
Cadillac GAGE COMPANY

20316 HOOVER ROAD • DETROIT 5, MICHIGAN

For SPEED and PERFORMANCE!

Reciprocating Action (In and Out)

PORTABLE *Electric* H & H TOOL



Motion is "in and out"—not spinning or rotary. Tool is portable — light weight — carry it anywhere — easy to handle. Self contained. Ready to plug into any 110 volt electric outlet. Use it for hand work on metal, wood, plastic or other materials that may be filed, sawed or polished. Delivers 1000 strokes per minute, much faster than hand methods. Complete line of files, scrapers, hones and other accessories available.

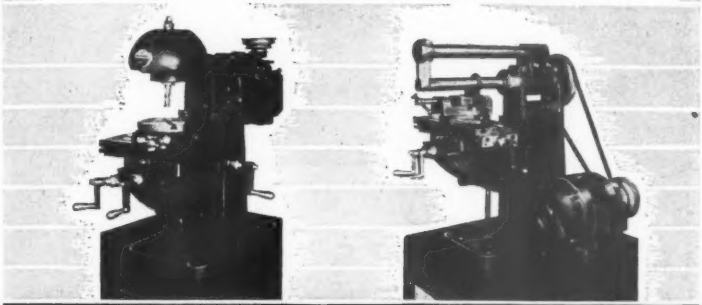
Delivery from Stock

Acme Tool Company

196 CHURCH ST. • NEW YORK 13, N. Y.

Mfd. by H & H RESEARCH CO.

ONE BENCH MACHINE FOR *BOTH* HORIZONTAL and VERTICAL MILLING



Vertical Mill *Horizontal Mill and Overarm*

FOR PRECISION TOOL WORK OR HIGH-SPEED PRODUCTION

Production Mill with Rack and Pinion Feed

benchmaster—offers a bench milling machine easily convertible from a conventional horizontal to a vertical miller by simply interchanging the spindle attachments.

ACCURATE • VERSATILE • LOW PRICED

SPECIFICATIONS: Table size—6" x 14"—Three Tee slots 3/8", 2" center • Longitudinal travel 8½" • Traverse travel 5½" • Vertical travel 8½" on vertical mill—9½" horizontal mill • Height 28" • Weight (less motor) 215 lbs. • Requires 1/3 h. p. motor • Spindle speeds (standard 1725 rpm motor) 450-850-1400-2100 rpm.

benchmaster tools

manufacturing company

2952 w. pico, los angeles 6, cal.

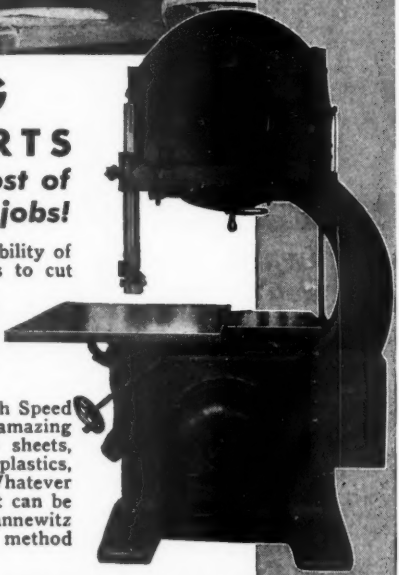
The SUPER METHOD

of TRIMMING FORMED PARTS

and performing a host of other metal cutting jobs!

The negligible down-drag and the ability of Tannewitz High Speed Band Saws to cut sheet metal from 90° to near 0 or 135° at tremendous speed make these machines ideal for trimming. Cuts can be made with perfect safety without using a rest of any kind.

Friction sawing with Tannewitz High Speed Band Saws also results in perfectly amazing time savings in the cutting of flat sheets, soft or hardened steels, armor plate, plastics, glass and many other materials. Whatever your cutting problem, chances are it can be done better and faster with Tannewitz Band Saws. Investigate this "Super" method of cutting.



FRICTION SAWING

with **Tannewitz**

HIGH SPEED BAND SAWS

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THE TANNEWITZ WORKS GRAND RAPIDS 4, MICHIGAN

Heat Treat Your Own Small Parts...

SAVE TIME AND MONEY THESE 5 DIFFERENT WAYS

This small compact electric furnace is inexpensive, handy and easy to operate—ideal for small tool and die shops—saves time these five different ways:

1. Eliminates delays in sending small machine parts out to overcrowded commercial heat treaters.
2. Saves time and expense of drawing or tempering small metal parts in large furnaces.
3. Cuts handling time when normalizing or annealing small parts. No waiting.
4. Conveniently available for pre-heating for subsequent high-speed hardening.
5. Eliminates shut downs and delays in servicing emergency repair orders.

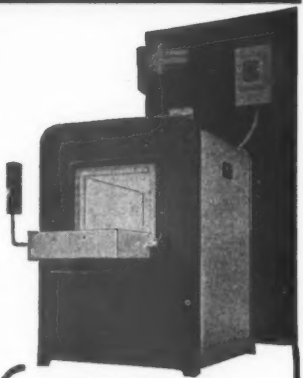
AVAILABLE IN TWO SIZES

Type	*Chamber Capacity*	*Amps 115 V*	*Watts*	*Amps 230 V*	*Price*
MH-3	8″W 6″H 14″L	29.6	3400	14.8	$124.00*
MH-4	10″W 6″H 18″L	....	4800	20.9	$191.00*

**Includes Hearth Plate*

MAX. SAFE TEMPERATURE—Continuous operation, 1750° F.; Intermittent operation, 1850° F.

AUTOMATIC CONTROL—Indicating Controlling Pyrometer—Thermo-couple and lead wire complete—$152.40.



REPLACEABLE HEATING ELEMENTS

Replaceable nickel chromium resistors embedded in rectangular refractory blocks. Elements form inner walls of furnace chamber, and may be replaced easily and quickly after removing rear panel — furnace structure remains undisturbed.

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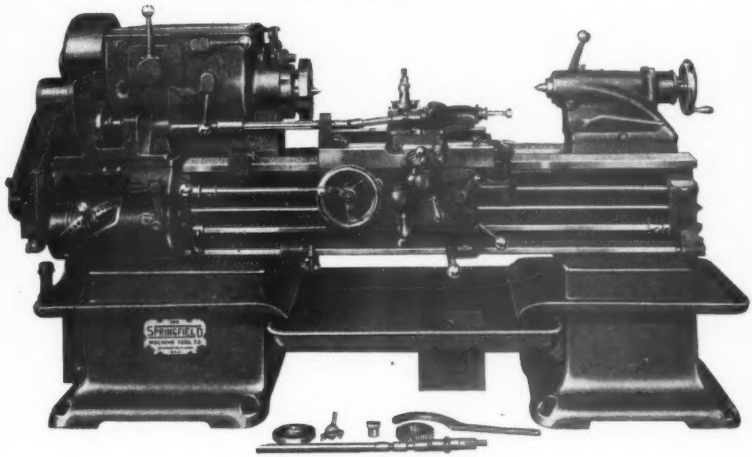
Out in front!



● Headstock . . . twelve speeds . . . only half of the easy-shifting spur gears mesh at one time.

Motors . . . V-Belt or silent chain drive.

Bed . . . permanently true—made of high test alloy to resist warp or marring under severe service.

Apron . . . extra heavy—operates on Ball and Bronze bearings throughout.

Taper attachment . . . hair-trigger adjustment.

Compound rest . . . sturdy, firm.

Tailstock . . . all bearings and bed ways oiled from one well.

From headstock to tailstock — the SPRINGFIELD Lathe is *out in front!*

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Tells the why and how of Springfield's accurate production.

THE SPRINGFIELD MACHINE TOOL CO.

SPRINGFIELD • OHIO, U. S. A.

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ROTOREX UNIVERSAL GRINDER

TOOL ROOM • MODEL SHOP • PRODUCTION

8" x 15" capacity. Variable spindle speeds ranging from 4500 to 6000 R.P.M., making the machine flexible and particularly suitable for delicate grinding jobs. Readily interchangeable attachments for single purpose jobs such as cylindrical, internal, and radius grinding, makes the Rotorex Grinder a universal machine for all kinds of grinding and sharpening operations.

Douglas Machinery Company, Inc.

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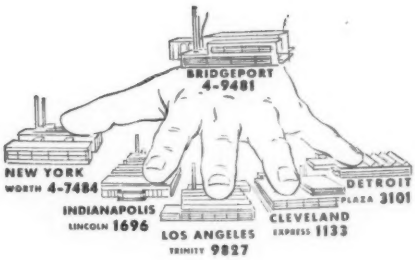

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Any Producto Plant is as near as your telephone.

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NOW- YOU CAN HAVE Hydraulic Action FOR YOUR Special Jobs WITH THESE STANDARD UNITS!

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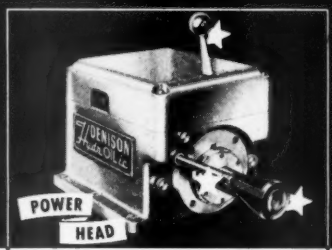
★ELECTRIC MOTOR ★ OIL RESERVOIR ★ PRESSURE REGULATOR

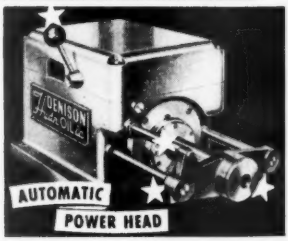


POWER HEAD

★ THROTTLE-ACTION CONTROL LEVER
★ PRECISION COUPLING DEVICE
★ STROKE-LIMITING SHIPPER ROD

● Here is *Standardized* Hydraulic Power! Two compact, self-contained assemblies—Pump Unit and Power Head—providing 4 or 6 tons of "packaged" hydraulic action or pressure for easy, economical adaptation to your special machines!

The Pump Unit includes electric motor, hydraulic pump, oil reservoir, and pressure regulating valve; and can be located at any convenient point. The Power Head incorporates fully-enclosed hydraulic cylinder, control valve, control lever, and the drive element (ram). Length of ram strokes can be regulated anywhere between 1/32-inch and 6 inches. Ram pressures may be limited anywhere between 300 pounds and 4 or 6 tons. The Power Head can be positioned at any angle to suit the job. Two styles of power heads are shown here; other types offer the revolutionary new Vibratory HydrOILic Pressure Principle and other combinations of control. Write for full information!



★ 5-POSITION CONTROL LEVER
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HydrOILics INDUSTRY'S RIGHT HAND

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For Reconversion Tool and Die Steels

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We'd like to say, "Pick up the 'phone and call the nearest Latrobe Warehouse for the steel you want." But these are days when war production still has first call, and conversion tool and die steels will not always be available until the final victory. When they are, Latrobe's seven warehouses, together with sales offices in principal cities will be able to give you the best in prompt, efficient tool and die steel service.

Make it a habit to call Latrobe first.

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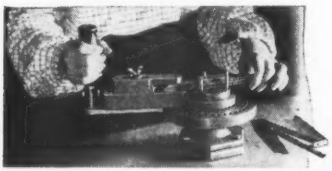
Talk About PRODUCTION Without DIES!

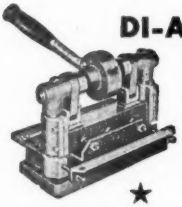
4,000 PARTS per DAY with DI-ACRO Bender

"Enclosed pictures in our plant prove the DI-ACRO Bender will do a real production job. We are making 4,000 completed parts per day which is competitive to most Power Presses." (Name on Request.)

Here is an example of "DIE-LESS DUPLICATING" typical of a great variety of formed parts readily made with DI-ACRO Precision Machines, — Benders, Brakes, Shears. Picture below shows the DI-ACRO Bender making an acute right angle bend and photograph above shows the finished part formed to die precision. Women operating DI-ACRO units maintain a high out-put on production work.



Pronounced "DIE-ACK-RO" ⟹



DI-ACRO Shear

Squares and sizes material, cuts strips, makes slits or notches, trims duplicated stampings. 3 sizes. Shearing widths, 6", 9", 12".

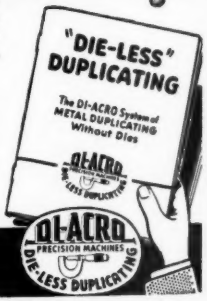
★

DI-ACRO Brake

Forms non-stock angles, channels or "Vees". Right or left hand operation. 3 sizes. Folding widths, 6", 12", 18".

Send for Catalog

showing DI-ACRO Precision Machines and many examples of parts made with "DIE-LESS DUPLICATING".


"DIE-LESS" DUPLICATING
The DI-ACRO System of METAL DUPLICATING Without Dies
DI-ACRO
DI-ACRO PRECISION MACHINES DIE-LESS DUPLICATING

O'NEIL-IRWIN MFG. CO.

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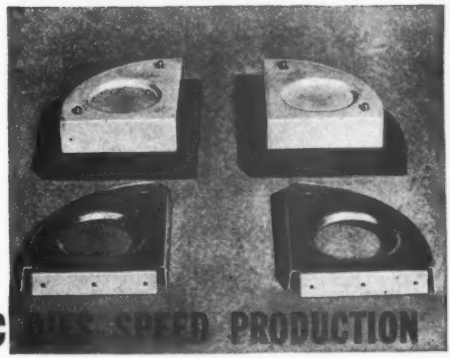


CAST PLASTIC DIES SPEED PRODUCTION

● Durez casting resins lend themselves readily to cast forms for hydropress operation. To make a forming die for a hydropress, the original pattern can be made of wood and a plaster cast mold made from this. The resin is poured in . . . without the need of a core if the part is small . . . and cured. It is then ready for immediate use. The above-illustrated cast plastic dies (and parts which were formed from them) produced hundreds of pieces which were without flaw.

CHARACTERISTICS OF CASTING RESIN

Tests have shown that the Durez casting resin, after curing, may be sawed easily, that it drills like hard maple wood, that it will not hold heat or be softened by it, and that it will not ignite. Standard wood- or metal-working equipment may be used to work it.

When it becomes essential to replace a conventionally made die, it has been found that it is not necessary to wait for a die to be remade in that material. Instead, in some instances, a part formed on the original die may simply be filled with a casting resin and the plastic cured into a usable die in a matter of a few hours. Furthermore, casting resins are particularly adaptable where the form or die has in it joggles or other similar insets which must be machined in the conventional die material.

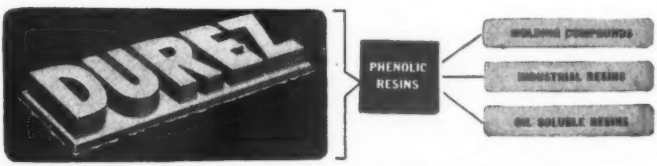
No such machining is necessary in the plastic die. The liquid resin follows the contours of the part exactly and holds those contours to predetermined tolerances.

OTHER USES

A few additional uses for these resins are stretch-press dies, jigs, assembly and holding fixtures, foundry patterns, and masking shields for plating.

FOLDER AVAILABLE

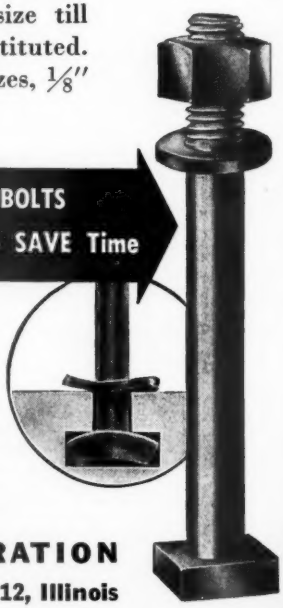
Write for authoritative folder on casting resins. Durez Plastics & Chemicals, Inc., 599 Walck Road, North Tonawanda, N. Y.



PLASTICS THAT FIT THE JOB

COPPER HEAD LAPS
PAY FOR THEMSELVES IN TIME SAVED

Lap holes the economical way . . . use Boyar-Schultz Copper Head Laps. They are fast working; they never wear out. The only wearing part is the inexpensive replaceable copper sleeve which is adjustable to maintain the correct lapping size till worn out and a new one is substituted. Available from stock in standard sizes, $\frac{1}{8}$" to $2\frac{1}{2}$".



BOYAR - SCHULTZ SMB MACHINE BOLTS
SAVE the Machine - SAVE the Job - SAVE Time

Worn, distorted Bolts like the one shown in the circle can damage the accuracy of machines, making costly repairs necessary.

Boyar-Schultz SMB Bolts are made from heat treated alloy steel for strength and toughness. Heads are machined square with bodies, presenting a clean, flat surface to the T-Slot. Threads are carefully cut. Close adjustment is possible and work is held firmly under heavy machine cuts. SMB Nuts and Washers are specially made for use with SMB Bolts.

BOYAR-SCHULTZ CORPORATION

2112 Walnut Street **Chicago 12, Illinois**

YES, correct for cleaning up both bottom and sides of beveled grooves is this "wheel" type Nicholson Cylindrical Shape Double Taper Rotary File (made in both Hand Cut and Ground types). It is also used to clean out large gears; and in the aircraft industry where, in the *Ground* type, it is widely used for work on cylinder head fins which may have been damaged in the casting process, or to smooth down and blend out fins which may have broken out.

The uses of Nicholson Rotary Files, in their various shapes, diameters and degrees of coarseness, are almost legion. They're fast-working, time-saving, problem-solving. . . . And bearing the Nicholson trade-mark of quality, they assure everything to be desired in the way of trueness, proper cut, expert hardening—and fine high-speed steel.

WRITE FOR CATALOG AND PRICE LIST—and for any special information you desire. For deliveries, consult your mill-supply house.

NICHOLSON FILE CO., 95 Acorn Street, Providence 1, R. I.
(In Canada, Port Hope, Ont.)

16 STANDARD SHAPES

(in either Hand Cut or Ground). 3 cuts—Coarse, Medium, Fine. Stock diameters—⅛" to 1⅛".

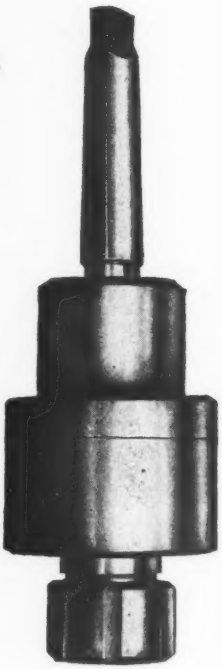
HAND CUT GROUND

NICHOLSON ROTARY FILES

HAND CUT AND GROUND • FOR EVERY PURPOSE

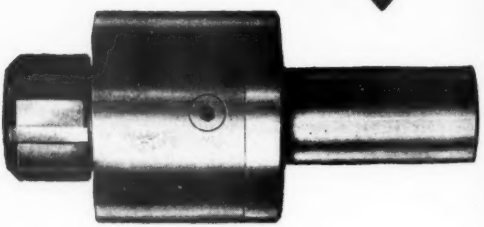
NICHOLSON U.S.A.

Announcing! NEW DESIGN OF UNIVERSAL FLOATING CHUCKS FOR BETTER BALANCE, EASIER CENTERING, SAVING IN TIME

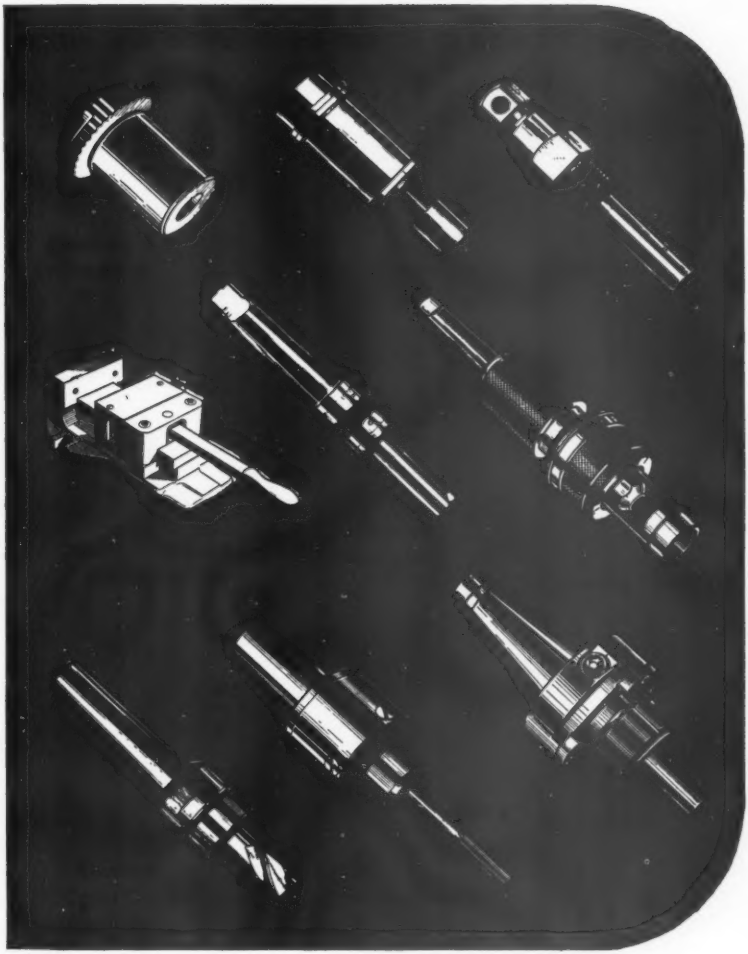


Two great advantages result from the new design of the Universal Floating Chuck. Flat springs permit quick adjustment to counterbalance tool weight when chuck is used in horizontal position. Chuck nose and tool can be brought to within a few thousandths of the center of work at high speed, saving considerable time. The second big advantage of the new Universal chuck is the seal which positively prevents the entrance of coolant into the chuck assembly. Neither the springs nor seal restricts to any degree the floating action of the chuck. For counter drilling, reaming and counterboring round, straight, smooth holes, use the new Universal Floating Chuck—positively the most sensitive float on the market today. Write for complete particulars.

FOR HORIZONTAL OPERATION ↓



↑ FOR VERTICAL OPERATION

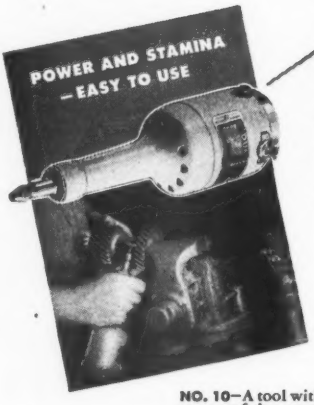


UNIVERSAL ENGINEERING COMPANY

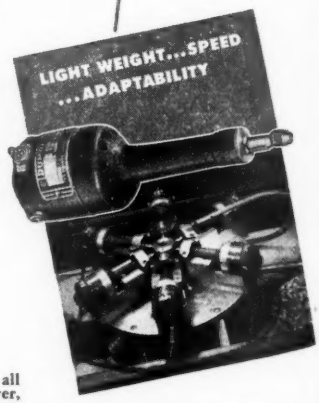
FRANKENMUTH, MICHIGAN — Fighter Plane Given by Employees — Employee Bond Deductions

WHAT DO YOU NEED IN A HAND GRINDER?

No matter which of these Dumore Hand Grinders you pick for your particular work, you'll find they all have these things in common: The outstanding Dumore construction features of compactness . . . light weight . . . power . . . high speed . . . endurance . . . and precision. Write for Catalog 42. The Dumore Company, Tool Division, Dept. T142, Racine, Wisconsin.



NO. 10—A tool with *double* the power of the average grinder. Speed, 22,000 R.P.M. Length, 9¼". Weight, 2 lbs. 15 ozs.



NO. 8—A lightweight, but *precision-built* throughout. Speed, 18,000 R.P.M. Length, 8⅛". Weight, 2 lbs. 6 ozs. Wheel diameters, 1/8" to 3/8".

NO. 9—With all its husky power, a smooth operating tool that gets into tight places easily. Speed is 15,500 R.P.M. Length is 15⅛" Weight is 7½ lbs.

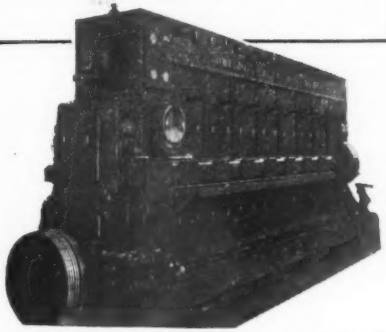
DUMORE

PRECISION AND HAND GRINDERS

SOLD BY AUTHORIZED INDUSTRIAL DISTRIBUTORS IN ALL PRINCIPAL CITIES

SUPERIOR DIESELS — *Dependable and economical power for every purpose, in every branch of American industry, on land, sea, or inland waterways.*

MARINE AND STATIONARY ENGINES . . . . 28 TO 1325 HP GENERATOR SETS, 20 TO 930 KW



"Sunnen Precision Hone is the Only Equipment We Have Found That Will Give Us the Absolute Precision Required"

Says The National Supply Company, manufacturers of Superior diesel, oil, and gas engines. On needle guides for diesel engine fuel pumps, a micro No. 1 finish is required in 1045 steel, 45 Rockwell C, and no tolerance is allowed.

This is another example of the many tough jobs being licked by using Sunnen honing. While accuracy is guaranteed to be within .0001", it has often been held to .000025" in hard steel. Such accuracy plus super-smooth finish assures absolute interchangeability. It keeps costs down and saves material by reducing the number of rejects.

If you have an internal finishing problem, find out how the Sunnen Precision Honing Machine might be applied to your job. Call in a Sunnen engineer. He will be glad to give you complete information and recommendations — or write for complete information.

SUNNEN PRODUCTS CO. • 7947 Manchester Ave., St. Louis 17, Mo.
Canadian Factory: Chatham, Ontario

Typical Jobs

Aircraft Hydraulic Brake Cylinder. Honing 3 times faster than lapping — and gave a straighter hole.

Carburetor Idler Valve Jet. Hole is honed after reaming for smooth action.

Bearing. A very small part. 2 micro-inch finish necessary.

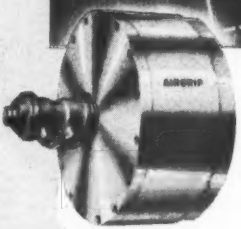
Roller Bearing Outer Race. Finish improved from 12 micro-inches to 2 micro-inches.

Aircraft Carburetor Operating Valve Sleeve. Sunnen honing eliminates distortion from assembling operation.

SUNNEN HONING

Speed • Accuracy • Finish

TURN DOWN High Machining Costs!



AIRGRIP Revolving Air Cylinders

"AIRGRIP" Cylinders cut costs by big time savings. Patented double ball bearings permit speeds formerly impossible. Wear automatically taken up by air pressure.

"AIRGRIP" Chucks

Step up machine output with "AIRGRIP" Chucks' two-fisted gripping—air locking power plus a 2-way cam-wedge locking power which locks jaws mechanically when gripping either externally or internally.

"AIRGRIP" Non-Rotating Cylinders

For pulling . . . pushing . . . lifting; controlled, safe, smooth, dependable power! Heavier walls—9/16"—require no tie rods—either end of cylinder removable.

OTHER ANKER-HOLTH COST REDUCERS

Air-operated Collets, Arbors, Mandrels, Drill Press Chucks, 2- and 3-jaw Finger and Compensating Chucks, Lubricating Assemblies, 3- or 4-way Air Valves (hand or foot operated), etc. Also Hydraulic Power Units and Fittings.

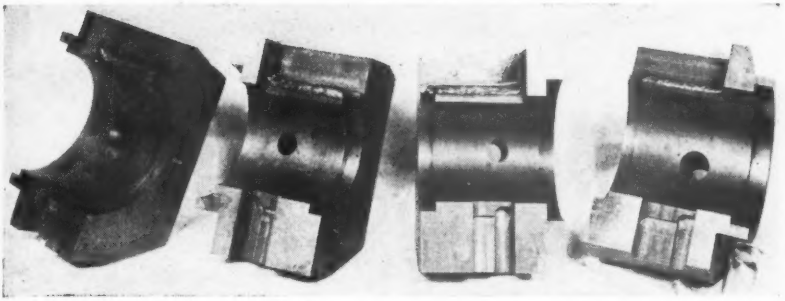
Representatives in all principal cities.

Write, mentioning products on which you desire bulletins.

1297

ANKER-HOLTH MFG. COMPANY

2735 Connors Street Port Huron, Michigan



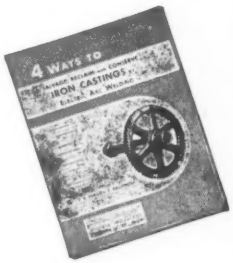
ARC WELDING SAVED THESE CAST IRON DIES

THESE cast iron extrusion dies were completely finished only to find that one groove had been incorrectly machined in each piece. A large investment in machining time was headed for the scrap pile, unless the grooves could be filled by welding. Two most important requirements for the weld repair were: (1) The deposit must be fully machinable, even through the line of fusion, and (2) the deposit must show absolutely no sign of porosity after machining. Three beads of 1/8" diameter PHILLIPS "600" Electrode deposited in each groove were enough to bring the parts back to size for proper machining. Each bead was thoroughly wire brushed before making the next deposit. After this simple and easy operation, it was found that all pieces machined perfectly and the deposit was entirely free of porosity.

Deposits of PHILLIPS "600" machine perfectly, because the core wire of this electrode contains no iron or other carbide forming elements. The welding causes no distortion of parts, because a minimum of heat is used, and that heat is localized at the point of application. No sign of welding is visible after machining, because deposits of PHILLIPS "600" are of the same color as cast iron.

Tool and die shops find many uses for PHILLIPS "600" Electrode, many applications which cannot be done satisfactorily by any other method. Yet the cost of application is low and the correct procedure is easy for the average welding operator. A reading of our "4-Ways" manual may suggest immediate and profitable applications in your plant.

THIS BOOK TELLS HOW



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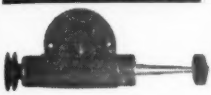

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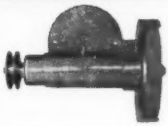

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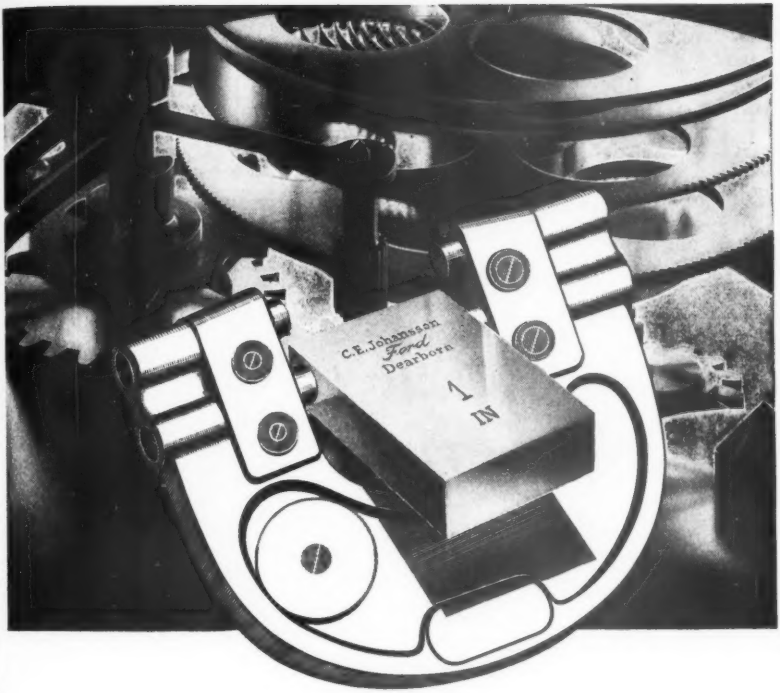

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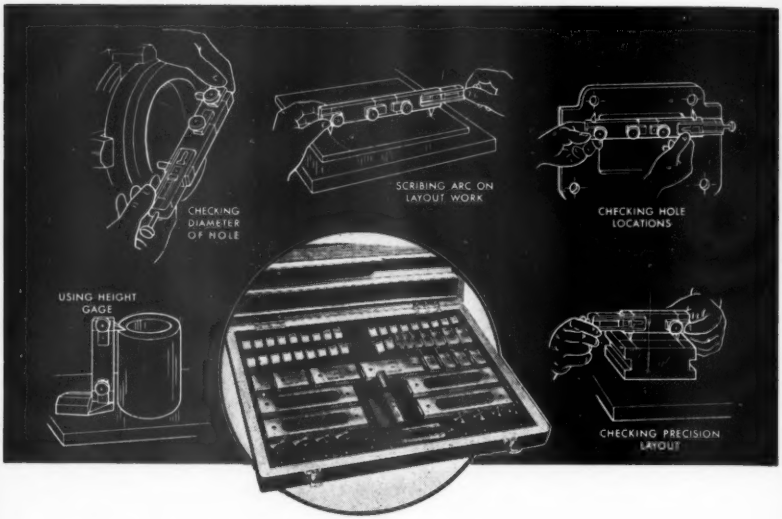

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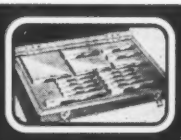

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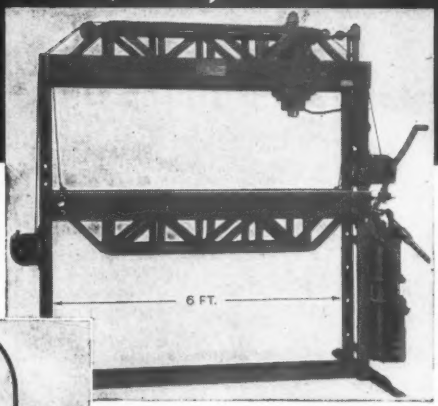

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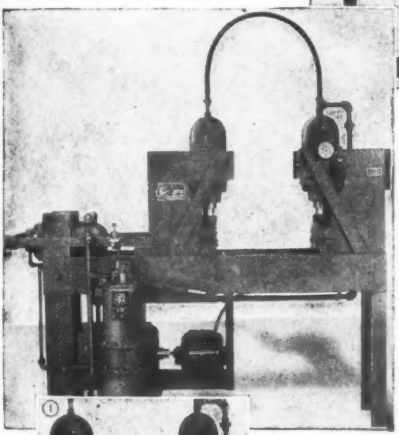
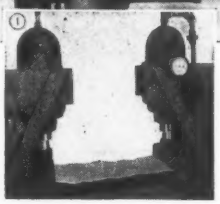
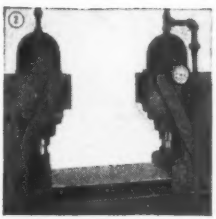




Illus. No. 1 shows "kinked" sheet metal as it comes from the rollers, gripped by the two vertical heads. Illus. No. 2 shows the sheet after being "stretched" flat by pulling pressure of the horizontal head.



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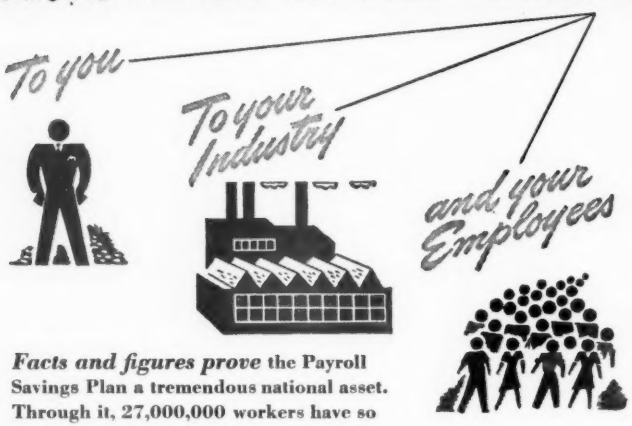

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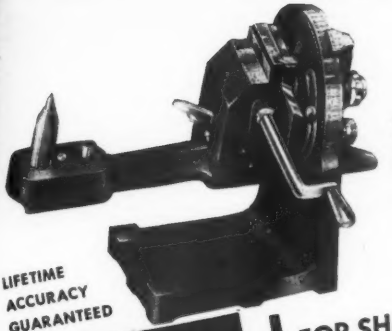

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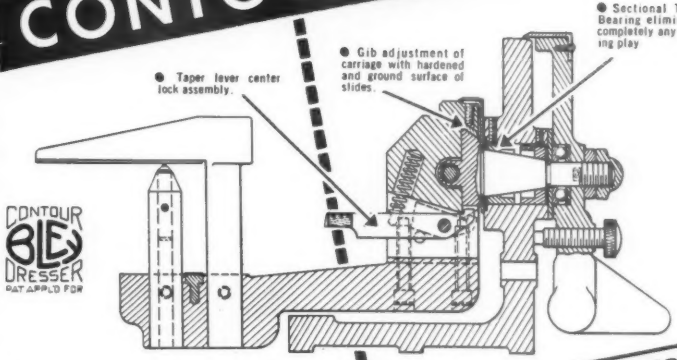
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ELONGATED natural point	5.00
Rattail Tools for Semi-Circular Radii	
1/2" Rattail, radii from 0.250"	$7.50
1/4" Rattail, radii from 0.125"	7.50
1/8" Rattail, radii from 0.060"	5.00
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6 EXTENSION SLEEVES and 1 RATTAIL TOOL ATTACHMENT ALL FITTED IN FINE HINGED WOOD INSTRUMENT CASE

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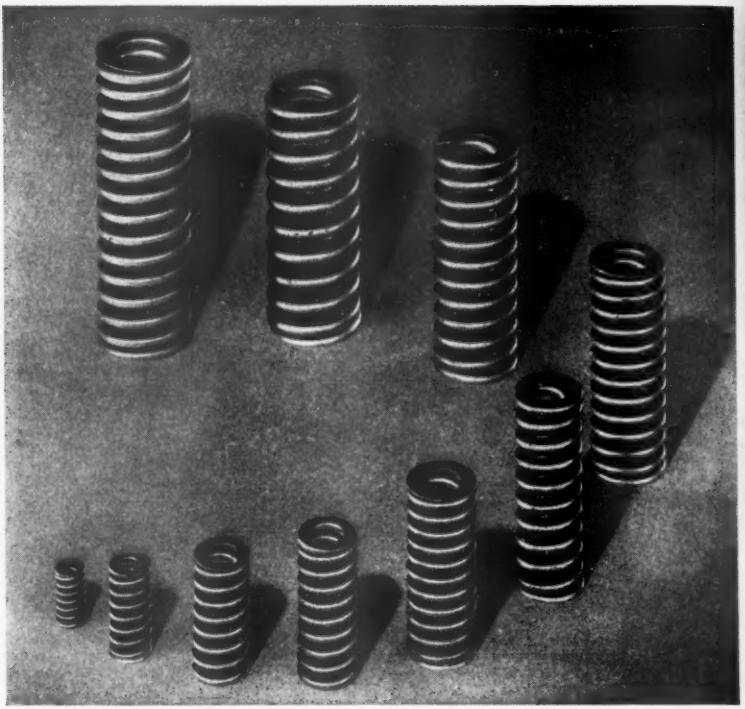

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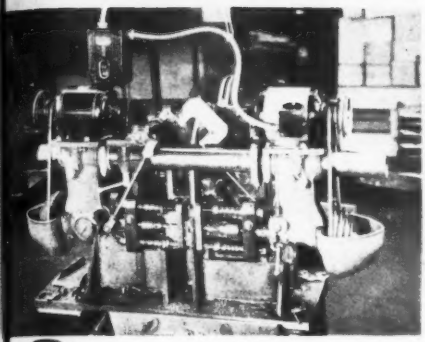
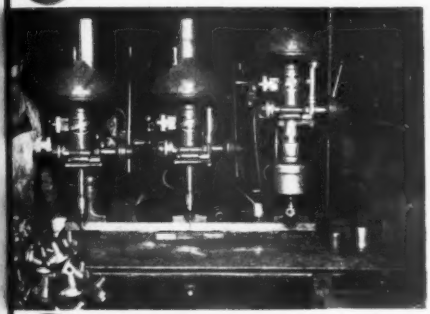
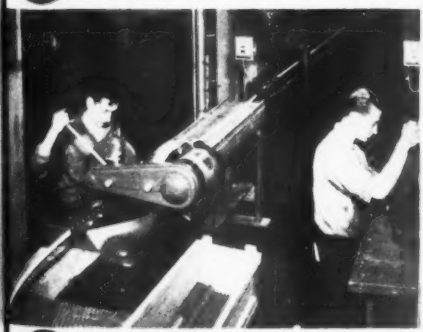
EVERY TYPE AND SIZE



1 Save the extra cost of special machines, by building your own high-production, specific-purpose units out of standard Delta components.



2 Make old machines useful — economically — by replacing worn-out assemblies with stock-model Delta components.



3 Utilize the portability and compactness of Delta-Milwaukee Machine Tools, to revise or supplement production-line layouts for increased man-hour output.

money-saving ideas on RETOOLING ...with flexible, low-cost

Delta
MILWAUKEE
REG. U.S. PAT. OFF.
Machine Tools

TURN THE PAGE

The flexibility and low cost of Delta-Milwaukee Machine Tools help you cut your investment risk

Delta
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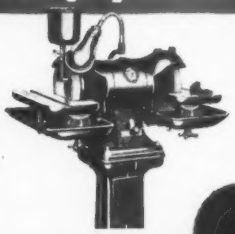
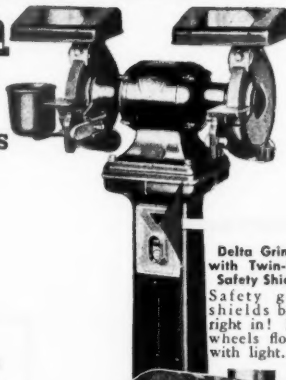
Machine Tools

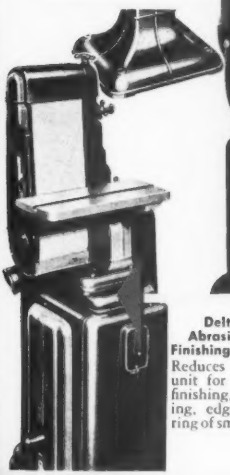


Delta Carbide Tool Grinder
For sharpening tungsten carbide tools, with a remarkably small initial investment.



Delta Grinder with Twin-Lite* Safety Shields
Safety glass shields built right in! Both wheels flooded with light.

Delta 14" Metal-Cutting Band Saw
Saves time and money on many operations—cutting almost any material from carbon steel to asbestos.



Delta 6" Abrasive Belt Finishing Machine
Reduces cost per unit for precision finishing, polishing, edging, burring of small parts.

Delta Super-Hi-Speed Drill Press
For precision small-hole drilling. Interchangeable with standard 14" model on regular column. Write for bulletin.

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- Tool Shop
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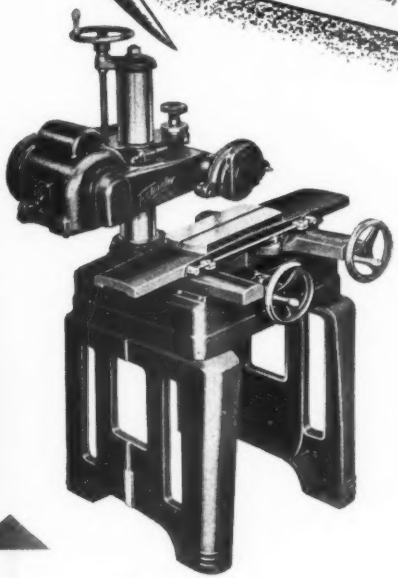
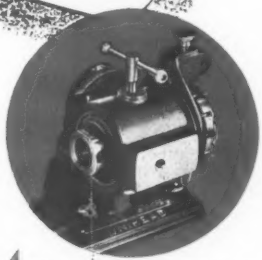
. . . on a wide variety of applications in working metals, plastics, wood.



Delta Toolmaker* Surface Grinder
Designed for ease and speed of surface grinding, tool sharpening, and any grinding operations within its range. Many advantages that help assure you of creditable performance. 7" x ½" wheel; 1¼" bore. Table surface 5¾" x 13".



With the Unihead,* and the tool and cutter grinder attachment, this machine becomes the latest development in Tool and Cutter grinding.

With the Univise* — and the coolant attachment — this machine serves as a dependable, accurate Chip-Breaker Grinder for grinding the chip-breaker groove on carbide-tipped tools.

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4-spindle model illustrated. 2-spindle model also available with one-piece table. Floor types with sectional tables: 3-, 4-, 5-, 6-, and 8-spindle models.

Delta Power-Feed Drill Presses
17-inch single-spindle drill presses available in 24 different models.

Delta 14" R... Type Drill P...
Patented ... construction p... vides *both* self-aligni... drive and free-floati... spindle.

These quality features minimize depreciation of your Delta-Milwaukee Machine Tools

1. Lubricated-for-life New Departure ball bearings.
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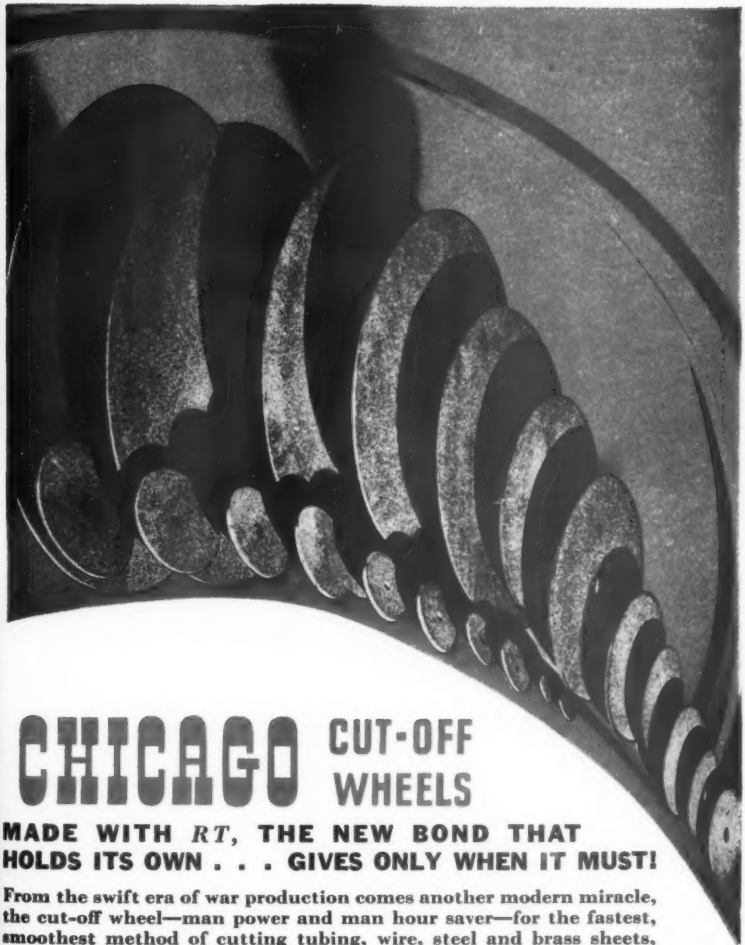
3. Precision-bored bearing seats.
4. Balanced pulleys.
5. Precision-ground shafts.

Delta Cut-Off Machine
Three models—with abrasive wheel, for cutting steel; with steel blade, for cutting plastics and non-ferrous metals; with cross-cut blade, for cutting wood.



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From the swift era of war production comes another modern miracle, the cut-off wheel—man power and man hour saver—for the fastest, smoothest method of cutting tubing, wire, steel and brass sheets, glass, porcelain, Stellite, tungsten, plastics, laminates and other hard-to-slice materials.

When RT, the special formula bond was developed, it put the cool-running CHICAGOS 'way out in front in real performance records.

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Tell us what you have to cut, grinder you use and size wheel you'd like. We'll send a test wheel promptly. Write for Circular.

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WITH BUILT-IN VALVE, OPERATING AND SPEED CONTROLS

Here is an air cylinder so radically different from conventional design that we call it an air "motor". It is not a rotary motor, but a double-acting, reciprocating power unit, complete within itself, with built-in valve, valve operating lever, and stroke speed controls. No separate valves or controls to buy! No intricate and cumbersome piping to install! Only *one* air connection is needed. Operates on any air pressure up to 175 lbs. The Bellows Air Motor is compact, sturdy in design and construction. Stroke lengths available 1" to 48".

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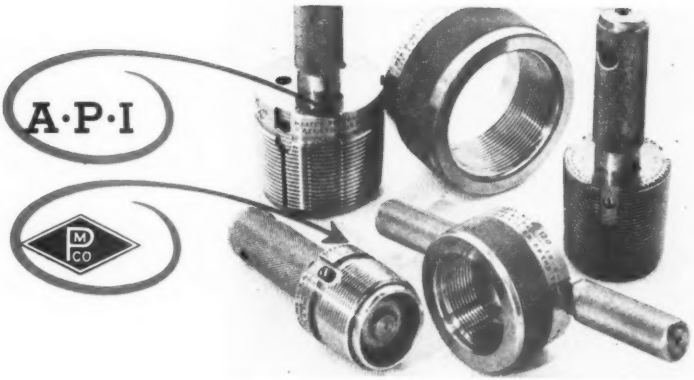

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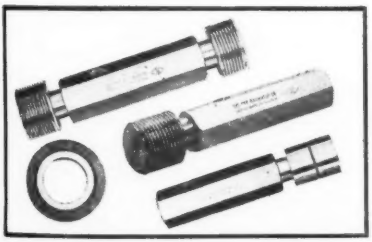

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TYPE 1 AM PULL IN COLLET OR TAPER SLEEVE ADAPTER FURNISHED

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SUCCESSORS TO
CLEVELAND TOOL ENGINEERING CO.

GRINDERS & FIXTURES, INC.
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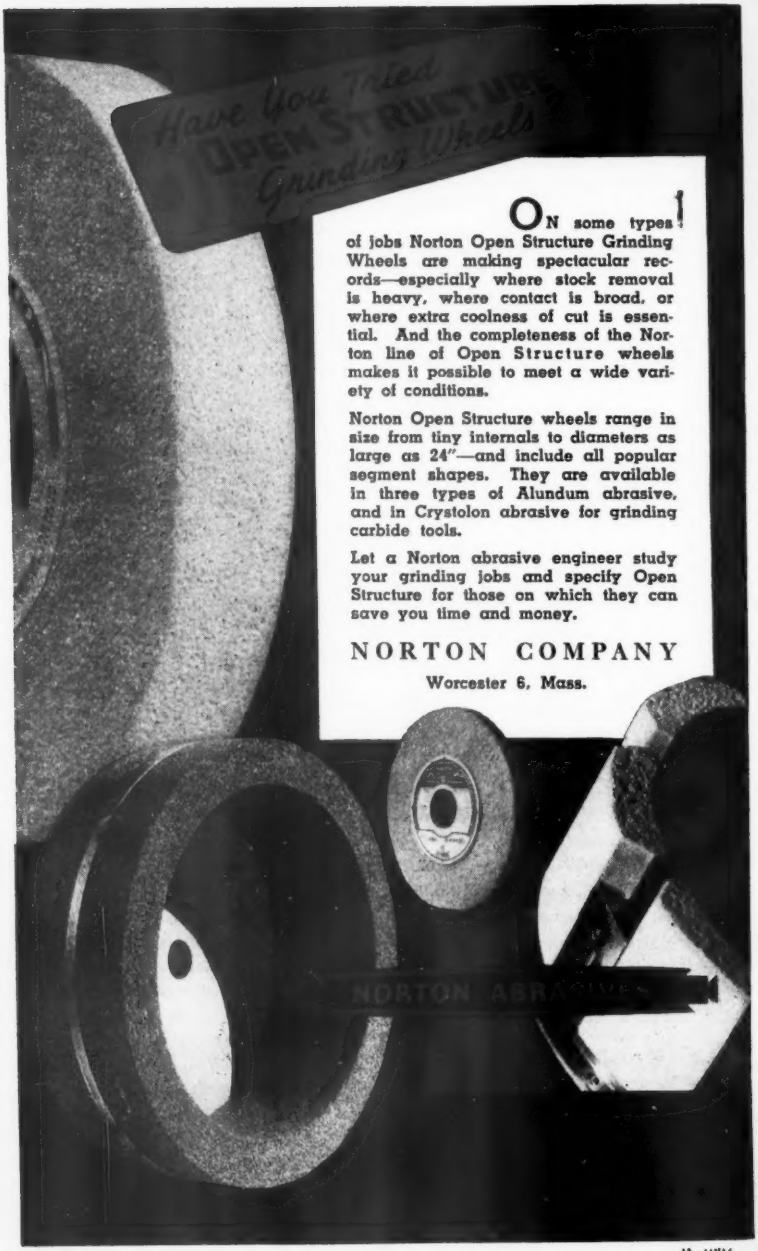

ON some types of jobs Norton Open Structure Grinding Wheels are making spectacular records—especially where stock removal is heavy, where contact is broad, or where extra coolness of cut is essential. And the completeness of the Norton line of Open Structure wheels makes it possible to meet a wide variety of conditions.

Norton Open Structure wheels range in size from tiny internals to diameters as large as 24"—and include all popular segment shapes. They are available in three types of Alundum abrasive, and in Crystolon abrasive for grinding carbide tools.

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Worried About Getting Tooled Up for Civilian Goods?

Call on Bloomfield Tool Corporation with your Problem

The same foresight that prompted us to include 10 Jig Borers in our list of equipment, guided our selection of all of the facilities of our modern plant.

We offer you the accurate workmanship guaranteed by such facilities, plus the advantage of our practical knowledge of tool construction for interchangeability, to pit against your tooling problems when converting to civilian goods.

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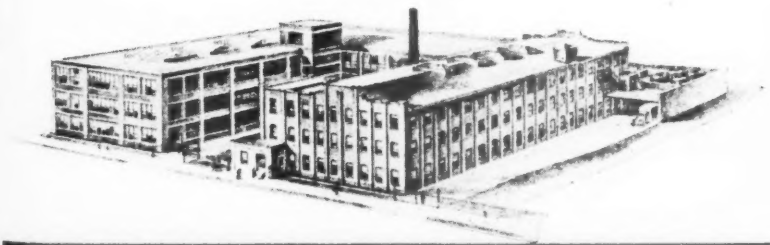

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# of GRAPH-MO STEEL

The Billeteer, a mechanical chipper, is used to remove surface defects from steel. As the steel slides into position the chipping head descends and gouges out flaws in heavy billets, subjecting the ways to grinding wear and abrasion.

Ways of ordinary steels are able to withstand this punishment for only short periods. In contrast ways made of Graph-Mo Steel, hardened to 60 Rockwell C, are still in service and are in excellent condition despite the fact that they have been subjected to four solid years of this rugged service!

Graph-Mo is an oil hardening steel that has 1.50 carbon content. As a consequence it has an appreciable amount of excess carbides which are extremely hard and offer stubborn resistance to wear. Some of the carbon is retained as free graphite which greatly improves resistance to scuffing and scoring. Graph-Mo Steel not only wears longer, it machines 25% to 30% faster than ordinary tool steels and offers reliable response to heat treatment.

To give tools, dies or machine parts a longer wear life make them from Graph-Mo or one of the other famous Timken Graphitic Steels, Graph-Tung, Graph-Sil, Graph-Al or Graph-M.N.S. A request written on your firm's letterhead will bring a fully illustrated 48 page book that tells how, when and where to use the five performance proven Timken Graphitic Steels. Steel and Tube Division, The Timken Roller Bearing Company, Canton 6, Ohio.

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Ways for the Billeteer were:
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1500°F.
End Quenched
in still oil
Tempered at
400°F.
for 5 hours
Produced Hardness
of 60 Rockwell C
(If desired Graph-Mo Steel can be hardened to 64 Rockwell C)

For heat treating data on other parts write for booklet, "Timken Graphitic Steel."

TIMKEN

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Lower Your Costs

FOR

ANGULAR GRINDING

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UNIV-ANGLE will give you faster, more accurate set-ups on both single and compound angle work. Angle determination is by the sine bar method, the most accurate method known. The UNIV-ANGLE itself is built to the closest limits assuring a set-up of utmost accuracy. Work is held magnetically, gripped firmly but without distortion, and released instantly.

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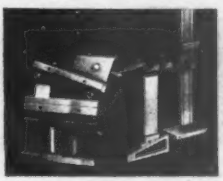
SAVE TIME ON INSPECTION and JIG BORING TOO



Non-magnetic units are usually used for inspection and jig boring. UNIV-ANGLE units may be purchased separately and, since all surfaces are ground and lapped to precision limits, any two units can be used together to obtain an accurate compound angle.

PRECISION BUILT BY THE MANUFACTURERS OF THE MAGNA-SINE

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We want to keep every BAKER Machine at work when its war-time job is done, whether in the hands of its original owner or a new owner. To that end we pledge our wholehearted co-operation and that of our dealers in any problems concerned with the refitting of BAKER Machines.

For complete information write, wire or phone the serial number of the BAKER Machine you are considering. We'll give you its history, tell you what it's capable of doing. You'll not be obligated in any way.

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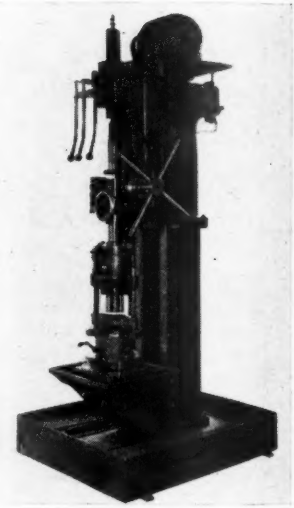

BAKER Model 150 Universal Quick Change Type Heavy Duty Drill

FEATURES

1. Flange quill spindle construction for efficient adaptation of multiple head
2. Easily, quickly retoolable for variety of single spindle or multiple drilling
3. Twelve changes of speed
4. Feed range from .005 to .143 per rev.
5. Furnished with five different feeds; transposing gives total of ten feed changes with one pair of gears
6. Reversing controller for tapping
7. All controls placed for easy, fast operation

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Oct. 21, 1944 · June 25, 1945

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SATISFYING those who are satisfied only by excellence . . . producing custom-designed tools for those Industrial Leaders from whom excellence is, in turn, demanded . . . Star Machine & Tool Company serves now as it has for three generations in the toolmaking field.

This background of craftsmanship in designing made-to-order precision tools, which are the foundation upon which our American system of mass production is built, will play its full part in facilitating the vital changes of the future.

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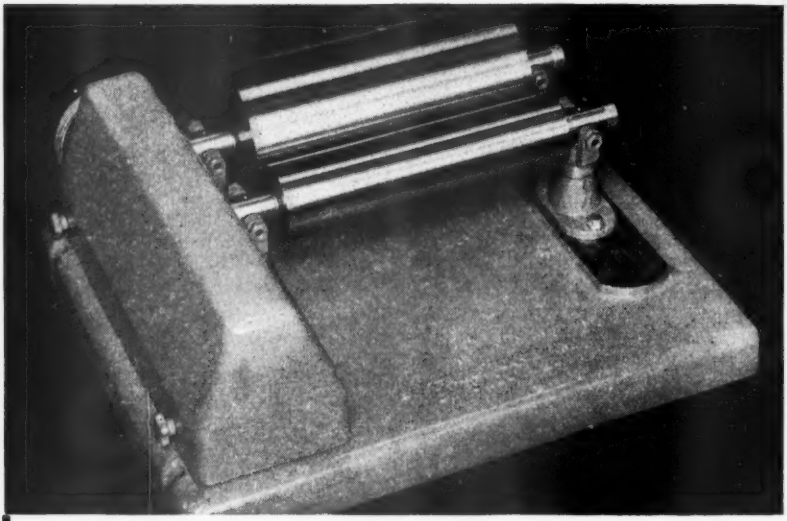

SPITFIRE ROLLER LAPPING MACHINE

For High Precision, Mirror Finish Lapping or Polishing of Cylindrical Plugs, Pins or Rods, Straight or Tapered

FEATURES

1. No chucks or collets
2. No ring laps needed
3. Work placed in or taken out without stopping machine
4. Laps either straight or tapered plugs or pins with or without shoulders
5. Large rollers keep piece cool
6. Removes longitudinal waves from plugs or pins
7. Quickly adjustable for various sizes
8. Handles plugs up to 6″ diameter

SAVINGS

9. Time: making rings
10. Inaccuracy: of shankless plugs
*11. Time: placing work-piece in chuck
*12. Time: continual starting and stopping of machine
*13. Time: adjusting and renewing ring
*14. Time: placing ring on work-piece
*15. Time: removing work-piece from chuck
*16. Time: cooling work-piece

* NOTE: *Operations 11 to 16 inclusive represent constantly repeated and wasted operations in ring lapping: completely eliminated in Spitfire Roller Lapping.*

Wire today for further information and name of your dealer.

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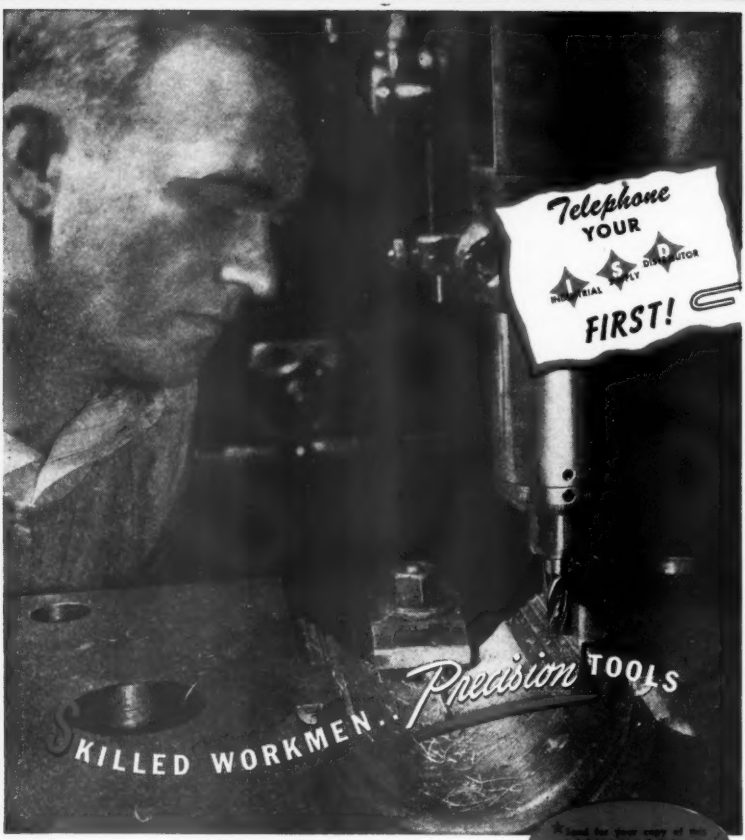

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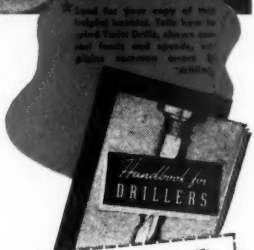

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Editorial

Our own postwar job

The cessation of hostilities in the Pacific sounded the opening of a field-day for editorial writers, columnists, commentators, as well as a legion of armchair authorities, all of whom, by means of their access to the multiplying power of the printing press or the broadcast channels, are telling either what must be done from here on in and who must do it or are expressing their relief that the easing of censorship permits them to unburden themselves of what they knew right along about radar and the atomic bomb development.

From where we sit, radar has rightfully been called the poorest kept secret of the war, and as far as truly understanding atomic energy is concerned we are still awaiting a masterpiece of simplification that will, of necessity, start in with the elementary physics and chemistry of ancient, slow-burning Chinese gunpowder!

We are deluged with pronouncements on what Management must do; what Labor must do; what President Truman must do; and likewise regarding the Congress, the OPA, Great Britain, etc., etc., until we are in such danger of being overwhelmed by the magnitude of the world-wide job of orderly recovery as to lose sight of our own niche in the system of free enterprise that has made this country great and the envy of the rest of the world.

We have heard much talk, during these war years of abnormal economic controls, of the necessity for preserving our system of free enterprise. Is it not obvious, based on the events of the past thirty days, that free enterprise is very much alive and kicking?

The atomic bomb put the finishing touches on the Japanese hopes of delaying their inevitable end. Thereupon, according to many accounts, the various governmental agencies were caught short without well-laid, painfully detailed plans for orderly reconversion. We wonder.

A wartime economy is so abnormal to our way of life that, admittedly, rigid controls were necessary to the successful prosecution of the war. Our peacetime economy has been built upon the profit system. There is no profit in war—the people lose on all counts—hence the controls. The termination of the war found our peacetime economy ready and waiting. The governmental controls have been relinquished faster than anyone deemed possible, but not too fast for free enterprise to welcome the green light and get under way with an increasing momentum that is apparent everywhere we look. We are on our way, and in a big way, to prove to ourselves and the world that the battle for markets based on a campaign of free enterprise and friendly competition is more profitable—the people gain on all counts—than any form of regimented economy which does not hold forth to the individual the incentive of profit; in terms of either a higher standard of living in exchange for his labor or a profitable return on job-creating, venture capital. We have done it before and we not only can do it again, but also, simply by drawing on past experience, do it on a more magnificent scale.

For the record and to demonstrate faith in our way of life, we want to define our job in this system of free enterprise as we see it.

The TOOL & DIE JOURNAL, like every other business paper or trade magazine, is a marketplace. A market can be defined as a meeting place for buyer and seller. We are just as much a marketplace as a machine tool distributor's display floor or a mill supply house city desk.

Our editorial columns report authoritatively and in technical detail on the latest and most profitable in tool design and the manufacture of production tooling, on new materials, on methods of production as they must conform to varying quantity and quality requirements. Also, in presenting this material while it is newsworthy we help to create a want, on the part of those who visit our marketplace, for that which is newer, better, cheaper, faster. That is but half of our job.

Our advertising columns carry the messages of, and serve as showcases for, manufacturers who are able to fulfill the needs created by and defined in our editorial columns. Therefore, the other half of our job is to help the suppliers most effectively meet those others who are also using our marketplace.

Although we cannot perform personal introductions all around, we can show them that our readers are those tool design and production engineering executives and owners of businesses whose wants most directly result in purchases.

We can help them in most effectively presenting their message. Our readers are going all-out for their own markets and by reading our columns admit their need for any and all new tools, machines, materials or processes that will enable them to beat the other fellow to the punch. Postwar advertising must recognize this; the claim that the landings on Okinawa were made possible by the Whoosiz synchro-gadget won't fill dealers' shelves. Much wartime advertising was of an institutional and patriotic nature, and rightly so. Postwar copy must conform to the competitive pattern by being attention arresting, factual and convincing.

Our readers' service department can and does help, in great volume, by getting product information and engineering specifications into the hands of prospective buyers who use our time-saving Inform-a-Gram cards.

In these and many other ways our editorial and advertising functions help both reader and advertiser.

This is our job and our own enterprise is its only limit. Our editorial columns must attract the buyer and our advertising columns must attract the seller. The more pleasant, effective and profitable we can make the meetings between buyer and seller, the better and more profitably we have done our job. Our own profit incentive prevails only so long as we conduct a profitable marketplace for both reader and advertiser.

editor

Crusher Roll Profiling of Grinding Wheels

A form tool of intricate profile and resultant high maintenance costs combine in an ideal test case for crusher roll profiling. Mr. Ehler's resourceful experimentation contributes valuable know-how to this relatively new technique, with promise of more to come.

by A. W. Ehlers
CONTRIBUTING EDITOR

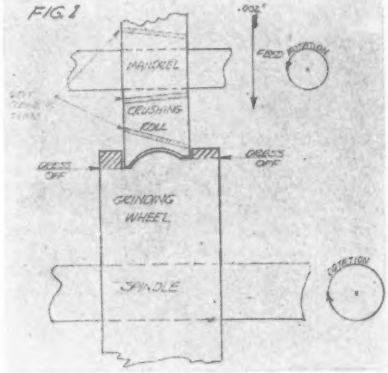
The reader, if he has been closely associated with profile grinding, knows the intricate setups necessary to accomplish the blending of compound radii and tangents thereto. The average tool or die maker when making an intricate tool or jig setup that necessitates profile grinding, spends a good percentage of the total tool time in profiling the grinding wheels. In most cases he is required to use several differently profiled wheels to attain the required compound radii and tangents. The profile blending by setting the grinding machine stops with gage blocks also presents an additional problem that complicates the manufacture. For a single tool or a single application this labor certainly is necessary.

The writer became definitely interested in the crusher roll profiling of grinding wheels when a certain complicated radius form tool became a problem. This tool, used in a first operation six spindle automatic had a high "mortality" rate when used on a particularly tough NE steel. The problem of maintenance became so acute that one Cincinnati No. 2 Tool and Cutter Grinder was continually tied up in salvaging and reforming this one tool. Some relief was obtained by carefully studying the diamond profiling operation using a Brown & Sharpe dressing attachment. Machine settings were recorded and standardized thus assisting the operator in consistently re-setting the cutter grinder. However, the tool cost on the operation remained abnormally high.

After reading all procurable literature on the methods of grinding wheel profiling by crusher roll, the writer came to the conclusion that grinding wheel crushing must necessarily be accomplished at a peripheral speed much lower than the accepted cutting speed of the grinding wheel, i. e., 4500-5000 surface feet per minute. This fact must necessarily be so if the wheel profile crushing tool was not to be destroyed by the grinding wheel action.

The accepted methods of this new technique seemed to require that the grinding wheel, revolving at a low peripheral speed, should be moved into the rotation plane of the crushing roll and thus drive or revolve the crusher by friction contact.

In adapting the roll crushing technique to the standard tool and cutter grinder, the problem of an auxiliary



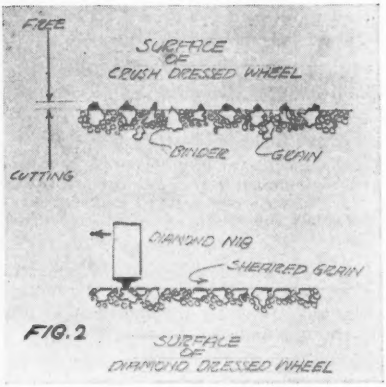


FIG. 2

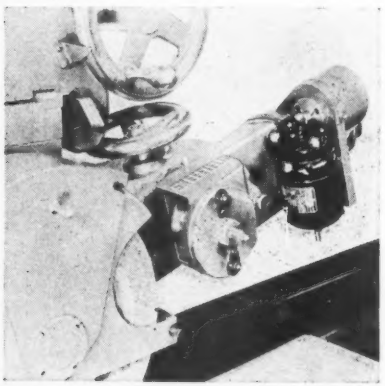
motor drive to the grinding wheel head presented itself. Accepting the conclusions of earlier experimenters that the wheel should drive the roll, a one-eighth hp motor was mounted by bracket on the spindle head post. It was belted to the wheel spindle and by subsequent pulley differentials made to impart a very low rpm to the grinding wheel.

Using Circular Form Tool as Experimental Crusher

Lacking a crushing roller at this point, a radii profiled circular form tool was mounted on an arbor and placed between working centers. The table was then fed into the slowly revolving grinding wheel. At the point of contact the roll began to revolve and it became evident that the profile of the circular form tool was beginning to impress itself upon the face of the grinding wheel. Further infeeding of the table soon produced a completely profiled grinding wheel. This initial attempt at profiling was accomplished in a very few minutes. To have duplicated the operation with a standard diamond dressing attachment would have been a matter of hours.

The improvised crushing roll, or circular form tool, was immediately checked on the optical comparator for deformation and abrasion. No perceptible change could be recorded. The profiled wheel was set up on both soft shank steel and hardened tool steel blanks and profiles were generated. Comparison on the optical comparator with the profile of the circular form tool showed a check within the limits of plus or minus .0002". This error in profile was attributed to the familiar problem of the intersection of two planes as the profile was generated with a seven degree front relief angle to the top of the tool shank. Allowance for this, therefore, would have to be made when designing the crusher rolls if close tolerances must be held.

The Sheffield Corporation of Dayton, Ohio, has developed this new, powered crusher dressing attachment for use with the Model "B" Thompson Surface Grinder. It is mounted on the wheel head slide.



Final Crusher Roll Design

A hardened high speed steel crushing roll of the profile necessary to generate the form of the troublesome tool mentioned in a previous paragraph, was subsequently designed and manufactured. As shown in the accompanying sketch of the tool, Figure 1, several slots across the face of the profile were cut in by using a standard one-eighth inch rubber bonded cut-off wheel. These slots were added to assist in clearing the roll of accumulated grit and bonding material from the crushed grinding wheel. Further experiments with other "gashed" crushing rolls seemed to indicate that the slots were more efficient in removing the grit and bonding material if they were staggered around the periphery of the crushing roll rather than being placed at equal intervals.

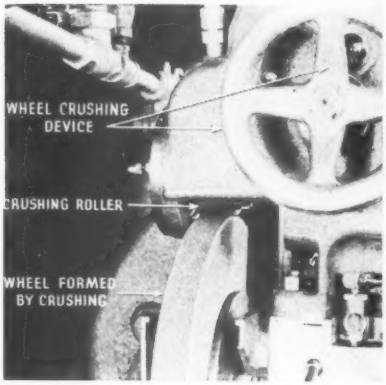
In adapting this specific crushing roll to our particular tool problem as men-

tioned we found that the tool could be completely reformed in a matter of a few minutes and that a formed grinding wheel would continuously produce accurate profiles.

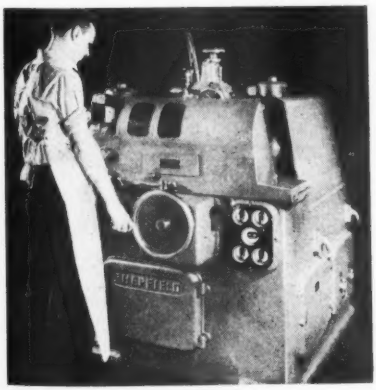
The average 60L-5BE aluminum oxide grinding wheel produced twenty-five to thirty tool profiles on hardened high speed tools before it needed reforming by crush rolling. The crush rolling operation was set up and accomplished in approximately ten minutes whereas it formerly required an hour or more. Also, the profile was consistent and was not subject to operator variables which often are apparent in diamond dressed profiles. After the expense of the original crushing roll was considered it seemed a very small item when considering the gain in time on the repeated grinding operations. It also became apparent that the less experienced tool grinders could be utilized for these operations once the master forming roll was made.

Life and Grain Characteristics of Crushed Wheel

The effective life of the crush formed profiled grinding wheel was noted to be quite a bit longer than that of a wheel profiled by the diamond dressing attachment. After investigation of the wheel grain profile under a twenty power lens the following conclusion was reached by the writer and is diagramatically represented by the sketch, Figure 2. In diamond dressing, the individual grain on the wheel surface is sheared off to a flat plane. In crusher roll dressing an entire grain is dislodged from the holding bond thus leaving an open wheel structure and a grain surface that is sharp. This conclusion may be questioned by the reader as to its absolute determination, but it is certainly evident that the crush profiled grinding wheel cuts more freely and does not "glaze" or "load" as quickly as the diamond dressed wheel.



A close-up of the arrangement on the Sheffield grinder for crush-dressing the wheel for thread or form grinding.



The Sheffield Precision Thread Grinder, on which either single-ribbed, or multi-ribbed, crusher dressed wheels may be employed for thread or form grinding.

No conclusive data can be given on the life of the crushing rolls, as tolerance restrictions are necessarily a limiting factor as to when a crushing roll is no longer within the necessary dimensions for a particular job. However, the writer has found that a very thin flash chrome plate on the crushing roll has assisted operators in maintaining the original contour by serving as a "telltale" that the roll should be stripped and replated when the parent metal begins to show thru.

Silicon Carbide Crushing

Experiments, to date, on the crush roll forming of silicon carbide grinding wheels for the grinding of cast irons and

For the Surface Grinder manufactured by the Thompson Grinder Company of Springfield, Ohio, this Thompson-built equipment for crush-dressing the grinding wheel is mounted on one end of the work table. The crusher roll is driven either by an independent motor or by the grinding wheel.

the tool carbides has not proven successful due to very great abrasive action on the crushing roll by the silicon carbide grit and bonding agent. Chrome plating and nitriding were of some assistance, but the life of the roll was very short and did not warrant the time and expense used in the roll manufacture. A solid carbide roll made from a plug gage blank worked rather well, but the writer would say that a molded form should be used and that it should be finish ground if regular application is contemplated.

Roll Crushing in Production Grinding

As the roll crushing technique became established in the tool grinding department the efficiency of the application became so apparent that it must logically be considered for production cylindrical grinding. The real difficulty in applying the crushing roll to standard cylindrical grinding machines was the necessity of providing an auxiliary grinding wheel drive for the low rpm needed on the wheel spindle. It was at this point that the writer wished for an application of the new AC-DC tube type converter and the resulting variable speed that could be attained with a direct current motor.

Reversed Crushing Procedure

However, an enterprising tool grinding foreman reversed the previously accepted method of having the grinding wheel drive the crushing roll. The auxiliary one-eighth hp motor had "shorted out" while he still had work to do. Using the cylindrical grinding attachment on the tool grinder with its slow motor driven spindle, he engaged the rotating crusher with the grinding wheel, which was at rest, and successfully formed a profiled wheel. Subsequent checks on the efficiency of the wheel form and the life of the crushing roll using this new method demonstrated that there was no appreciable difference. Therefore, the crushing roll could be easily applied to any cylindrical grinder having a work spindle attachment without the necessity of an auxiliary wheel driving attachment.

A crushing roll was immediately tried on a standard Norton grinder with excellent results using a mandrel keyed to the crushing roll and being driven by the work spindle attachment.

Crushing Surface Speeds

Further experiments soon necessitated an established relation between the OD of the crushing roll and the OD of the grinding wheel. It was found that if the grinding wheel were driven at approximately 350 sfm the results were the best. Therefore, using the pulley or gear formula for two diameters, the crushing roll diameter in each case could be arrived at based on the rpm of the work spindle attachment. The very small variable in efficiency due to friction drive loss is not considered because the actual rpm can vary slightly without any appreciable effect.

Feeds and Coolants

In production grinding, using a crush roller and the work spindle attachment, the table traverse stops should be so adjusted as to accommodate the mandrels for both the crush roller and the actual workpiece, thus making the wheel dress roller engage the grinding wheel in exactly the same center line of approach.

(TO PAGE 143—PLEASE)

Deep Drawing Filter Cases

Part II

(Continued)

These articles detail the deep drawing press work of the Bellevue Manufacturing Company in making the cases for Fram Oil Filters. Part II, concluded this month, has covered a blanking and three-draw operation. Part III next month will describe the tooling and blanking, drawing and finishing operations in producing the Type F-40 Fram Filter.

by Carl J. Nagel

The filter cases, upon removal from the second operation Verson press, are transported by box-type hand trucks to the third and final draw which is made on a 5-A Bliss press.

Anneal Precedes Final Draw

Before the third draw, the top halves of the filter shells are annealed to a cherry red. This anneal accomplishes two objectives; it insures against breakage of the upper edges of the cases when they are trimmed to final size after the third draw and at the same time prevents excessive wear on trimming punch.

These workpieces are representative of the four operations (one blanking and three drawing) involved in producing the case for the Fram Oil Filter, Type F-31. Last month's installment covered drawing the .093″ x 15″ blank to a shell of first, 9″ OD by 5½″ deep, and then to 7¼″ OD by 7″ deep. Part II is concluded this month with the description of the final draw to 5″ OD by 9½″ deep and the several finishing operations.

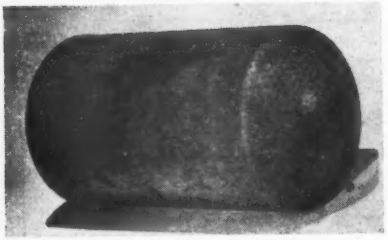
Tooling For Final Draw

The drawing, Figure 6, shows the construction and bill of materials of the tooling for the third and final draw applied to the Type F-31 Fram filter case.

The machine steel upper die holder shoe, detail B, Figure 6, is bolted to the upper bolster plate, detail A, by four standard 1″ hex-head cap screws, detail Q. The bolting and clamping assembly is completed by four standard 1″ lockwashers, detail K, and four each plain steel clamps and clamp supports as shown by details S and R.

The hardened and ground tool steel pilot punch, detail D, is bolted to the upper die holder shoe, detail B, by means of four standard ½″ fillister head or socket head cap screws, detail T.

The machine steel punch adaptor, detail C, the hardened and ground tool steel trim punch insert, detail F, and the hardened and ground tool steel punch proper, detail W, are assembled into one unit by means of the standard 2″ stud, detail E. The trim punch insert is locked into position and permanently located with reference to the punch adaptor, detail C, by three standard ⅜″ socket or fillister head cap screws, detail V. Three equi-spaced tapped and counterbored holes accommodate these screws which insure against any rotation between the punch adaptor, trim punch insert and



Above, two views of the Filter shell after completion of the third draw. The case has been reduced to 5" OD by 9½" deep and trimmed by the trim punch on one stroke of the press. Figure 6, page 121, shows the tooling and bill of materials for this final draw.

punch. To further insure perfect alignment between the trim punch insert and the punch, a shoulder is turned on the upper end of the latter which engages a recess turned in the mating face of the trim punch insert.

The tool steel punch is tapered approximately 2° (1° on each side) to facilitate removing the filter cases from the punch after the draw.

The lower, machine steel die holder, detail H, is bolted to the lower bolster plate by four standard 1" hex-head cap screws. The balance of the clamping assembly is made up of the plain steel clamps, detail L, clamp supports, detail N, and the 1" standard lock-washers, K.

The hardened and ground tool steel die ring, detail V, is bolted to the lower die holder, detail H, by the four equispaced, standard ½" fillister or hex-head socket cap screws, detail G. The die ring is machined and ground to a 30° entering angle with a ¼" radius where the metal is drawn through the die ring.

Details O and P show, respectively, the hardened and ground tool steel bottoming punch or pad and the 1" standard machine bolt, all of which in combination also serves as the knockout to eject the work from the die.

The dotted lines throughout Figure 6 show the bores in the punch adaptor, standard 2" stud, punch proper and bottoming punch or pad which are provided to permit the escape of air trapped during the draw and to facilitate freeing the work from the punch.

Detail J, and the accompanying photo, show the work as it is shaped at the end of the third and final draw. The drawing also shows the scrap trimmed from the upper edge of the shell by the trim punch insert, detail F.

After the annealing operation which immediately precedes the third draw the cases are dipped in a lard oil drawing compound before being fed into the press. After ejection from the press the cases are loaded on box-type hand trucks for transporting to the next operation.

Fourth Operation

A ½" oil line hole is extrusion punched in the bottom center of the filter shell and then lug riveted to provide sufficient material for the ¼" pipe threads. Two dies in a Ferracute press result in an extrusion operation on one case and a riveting operation on a second case with each stroke of the press.

Fifth Operation

Another oil line hole is extrusion punched in the bottom of the filter, 1½" off center, and lug riveted. This operation is performed on a Verson No. 4, Series 1815, press.

Sixth Operation

Similar to the fourth operation, a third oil line hole is extrusion punched

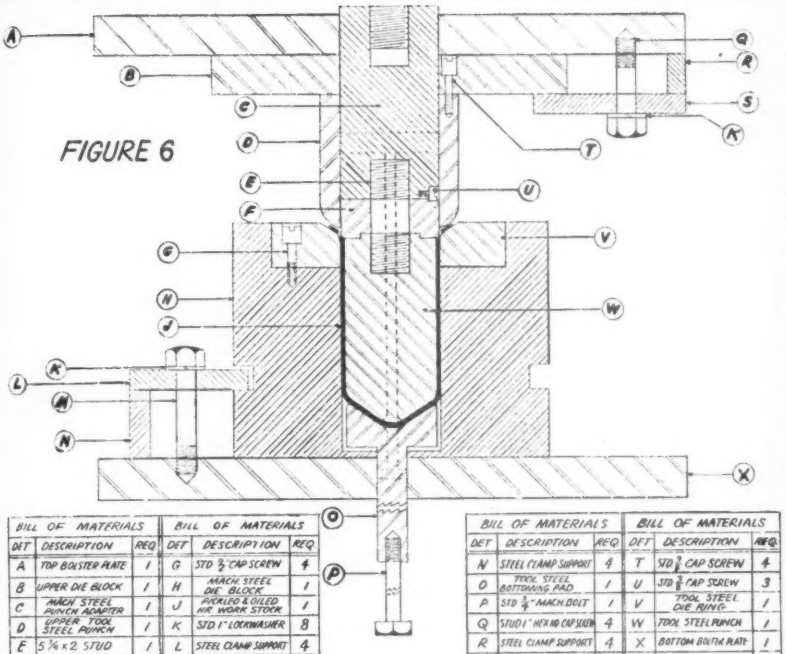


FIGURE 6

BILL OF MATERIALS			BILL OF MATERIALS		
DET	DESCRIPTION	REQ.	DET	DESCRIPTION	REQ.
A	TOP BOLSTER PLATE	1	G	STD ⅜ CAP SCREW	4
B	UPPER DIE BLOCK	1	H	MACH. STEEL DIE BLOCK	1
C	MACH. STEEL PUNCH ADAPTER	1	J	PICKLED & OILED HR. WORK STOCK	1
D	UPPER TOOL STEEL PUNCH	1	K	STD 1" LOCKWASHER	8
E	5¾ x 2 STUD	1	L	STEEL CLAMP SUPPORT	4
F	TOOL STEEL TRIM PUNCH PLATE		M	STD 1" HEX HD CAP SCREW	4

BILL OF MATERIALS			BILL OF MATERIALS		
DET	DESCRIPTION	REQ.	DET	DESCRIPTION	REQ.
N	STEEL CLAMP SUPPORT	4	T	STD ⅞ CAP SCREW	4
O	TOOL STEEL BOTTOMING PAD	1	U	STD ⅞ CAP SCREW	3
P	STD ⅞ MACH. DOLT	1	V	TOOL STEEL DIE RING	1
Q	STUD 1" HEX HD CAP SCREW	4	W	TOOL STEEL PUNCH	1
R	STEEL CLAMP SUPPORT	4	X	BOTTOM BOLTH PLATE	1
S	STEEL CLAMP SUPPORT	4			

and lug riveted in the side of the filter, approximately 4" from the top edge. This is done on a No. 14 Toledo press and, as in the fourth operation, each stroke of the press extrudes one opening and lug rivet another.

The ⅝" OD lugs, over which the extruded metal is riveted, are punched out of plain, hot-rolled, 1⅛" wide flat strip steel, on a No. 15 Cameron press.

The ½" oil pipe, assembled in the center of the filter, is cut to length and threaded on a No. 6 Warner & Swasey in one operational setup.

Filter Covers—First Operation

The cover for the Fram Oil Filter, Type F-31, is blanked out to 5½" OD from 5/32" stock. This is plain, hot-rolled steel strip, pickled and oiled. From a strip 12⅞" wide, 34 pieces are blanked out on a 206-C Toledo press.

Second Operation

The cover blanks are fed into a Bliss double-geared press and drawn or formed to the initial rough shape.

Third Operation

The final sizing and setting to shape are applied to the cover in a No. 8 Bliss press.

Fourth Operation

The extruded hole in the top center of the cover is punched out on a No. 5 Marshalltown press.

Fifth Operation

Around the extruded material of the cover center hole one end of a coil spring is assembled and the extruded metal is "set over" thus securing the end coil of the spring. This is done on an L & J No. 3 press.

Conclusion

All filter cases, covers and other parts are finally put through a degreasing operation, following which they are shipped to the Fram Corporation at Ann Arbor, Michigan, for painting and final assembly.

Lot-by-Lot Inspection For Quality Control

by A. L. Atherton
SUPERVISOR OF QUALITY CONTROL
Westinghouse Electric Corporation
East Springfield, Mass.

Lot-by-lot inspection, sometimes called acceptance inspection, is a method devised and generally used to determine the acceptability of a specific lot of units by inspecting a sample of those units. To give the desired results, and to provide that the system can be handled in a routine way, it is necessary to determine and take into account several factors including the relative importance of various dimensions or characteristics such as hardness, finish, etc.; the allowable percentage of units out of limits for each characteristic which it is economical to accept without the expense of screening; and the required degree of assurance that this percentage is not exceeded. These factors, together with the number of units in the lot being inspected, will govern the size of the sample and thus the practicability of the procedure.

As worked out by the Army for inspection of bomb fuzes, the Standard Sampling Inspection Plan, a lot-by-lot inspection procedure based on the Shewhart principles but with the details of the procedure worked out by the Inspection Branch, Ammunition Division of the Office of Chief of Ordnance in Washington, uses five classifications of importance of dimensions or other characteristics, i. e., critical, special, major, minor, and incidental. Most of the dimensions for every part of the fuze have been classified by Ordnance Inspection into one or another of these groups, although a few of the still less important dimensions are unclassified. The intention is that the major attention of the Army inspectors using this system will

FIG. 1 TABLE I.—NORMAL LOT-BY-LOT ACCEPTANCE INSPECTION

Sub-Lot Size		500 to 700		701 to 1,200		1,201 to 3,199		3,200 to 7,999		8,000 to 21,999		22,000 to 109,999		110,000 to 549,999		550,000 and Over		Approximate Avgl. Percent Defective
First sample Size		50		75		100		150		200		300		500		1,000		
Second Sample Size		100		150		200		300		400		600		1,000		2,000		
Acceptable Quality Level (Percent Defective)		Acceptance Numbers		Acceptance Numbers		Acceptance Numbers		Acceptance Numbers		Acceptance Numbers		Acceptance Numbers		Acceptance Numbers		Acceptance Numbers		
Major	Minor	c_1	c_2	c_1	c_2	c_1	c_2	c_1	c_2	c_1	c_2	c_1	c_2	c_1	c_2	c_1	c_2	
.005-.010		*	*	*	*	*	*	→	→	→	→	→	→	→	→	0	1	.06
.011-.020	.005-.010	*	*	*	*	*	*	→	→	→	→	→	→	0	1	0	2	.10
.021-.030	.011-.020	*	*	*	*	→*	→	→	→	→	→	0	1	0	2	0	3	.15
.031-.060	.021-.030	*	*	→	→	→	→	→	→	0	1	0	2	1	3	1	5	.25
.061-.10	.031-.060	→	→	→	→	→	→	0	1	0	2	1	2	1	4	2	7	.35
.11-.15	.061-.10	→	→	→	→	0	1	0	2	0	3	1	3	2	5	3	9	.50
.16-.25	.11-.15	→	→	0	1	0	2	1	3	1	4	2	5	3	7	4	13	.80
.26-.50	.16-.25	0	2	1	2	1	3	2	4	2	7	3	8	4	13	7	23	1.0
.51-1.0	.26-.50	1	3	2	4	2	6	3	9	4	11	5	13	7	23	14	40	2.0
1.1-2.0	.51-1.0	2	4	3	5	3	8	5	13	6	16	8	25	14	40	←	←	3.0
2.1-3.0	1.1-2.0	3	5	4	8	5	11	7	18	9	24	12	35	←	←	←	←	4.0
3.1-4.0	2.1-3.0	3	9	5	11	6	16	9	23	11	32	16	47	←	←	←	←	5.0
4.1-5.0	3.1-4.0	4	10	6	14	8	19	11	28	14	37	←	→	←	→	←	←	6.0
	4.1-5.0	5	12	7	17	10	23	14	33	18	44	←	←	←	←	←	←	8.0

*Table not applicable in this region. Use Table VI.
→ Use sample size in first column to right in which acceptance numbers are shown for Acceptable Quality Level involved, except as indicated under Note 4 below.
← Use sample size in first column to left in which acceptance numbers are shown for Acceptable Quality Level involved.

FIG. 2 TABLE V.—LOT-BY-LOT INSPECTION FOR INCIDENTAL DEFECTS

Sub-lot Size	300 to 750	751 to 1,200	1,201 to 3,200	3,201 to 7,200	7,201 to 21,000	21,001 and Over
A. NORMAL SAMPLING						
First Sample Size	10	15	20	30	40	60
Second Sample Size	20	30	40	60	80	120
Acceptable Quality Level (Percent Defective)	Acceptance Numbers	Acceptance Numbers	Acceptance Numbers	Acceptance Numbers	Acceptance Numbers	Acceptance Numbers
	c_1 c_2	c_1 c_2	c_1 c_2	c_1 c_2	c_1 c_2	c_1 c_2
.5	1 3	2 4	2 6	3 8	4 12	5 18
1.0	2 5	3 7	4 9	5 11	7 19	← ←
1.5	3 7	4 10	5 14	7 20	← ←	← ←
2.0	4 9	5 14	6 18	← ←	← ←	← ←
B. SINGLE SAMPLING						
Sample Size	15	23	30	45	60	90
Acceptable Quality Level (Percent Defective)	Acceptance Number	Acceptance Number	Acceptance Number	Acceptance Number	Acceptance Number	Acceptance Number
	c	c	c	c	c	c
.5	2	3	4	6	8	10
1.0	4	5	7	9	12	←
1.5	5	7	9	12	←	←
2.0	6	8	11	←	←	←

← Use sample size in first column to left in which acceptance number is shown for Acceptable Quality Level involved.

be devoted to the listed dimensions but they are also instructed to make occasional checks on the unlisted dimensions. An example is of one of the listings, for an assembly of firing pin and striker. In this case there is one special characteristic, three majors, three minors, and four incidentals.

Figure 1 is a table prepared by the Industrial Service of the Office of Chief of Ordnance. It combines information for each size of lot as to size of sample and number of defectives permissible for each of the acceptable quality levels listed in the first two columns. This tabulation applies only to major and minor characteristics. Critical and special characteristics are of such great importance that the intention is to permit no defectives, the difference between the two being merely the desired degree of assurance of this result. In the case of this particular product, the critical characteristic of the assembly is the presence and workability of the gear train, and assurance in regard to this characteristic is secured by three separate and different tests performed on each fuze. In the case of special characteristics, it is less important to be sure of the result and checking by samples is accepted although no defects are permitted. Incidental defects are lowest of the listed characteristics in the scale of importance, below majors and minors, and are checked by smaller samples and with greater percentages of defectives permitted, in accordance with the table of Figure 2.

The size of lot, or sub lot, used depends on various factors such as production rate, amount of inspection on the piece and value of the piece. For example if the average lot size for most parts is approximately 10,000, a sample of 370 parts for special or 200 parts for major and minor characteristics is required and one-fifth this or forty for incidentals.

In any case, if the number of defectives does not exceed that shown by the applicable table, the lot is accepted. If it does exceed the permissible number, a second sample is taken according to the table and the lot passed or rejected. In the case of rejections after the second sample, the entire lot must be gaged for the offending dimensions or characteristics in order to screen out the defective units which may then be scrapped, repaired, or in some cases, used by special waiver.

Most contracts call for submitting to the Ordnance inspectors only material

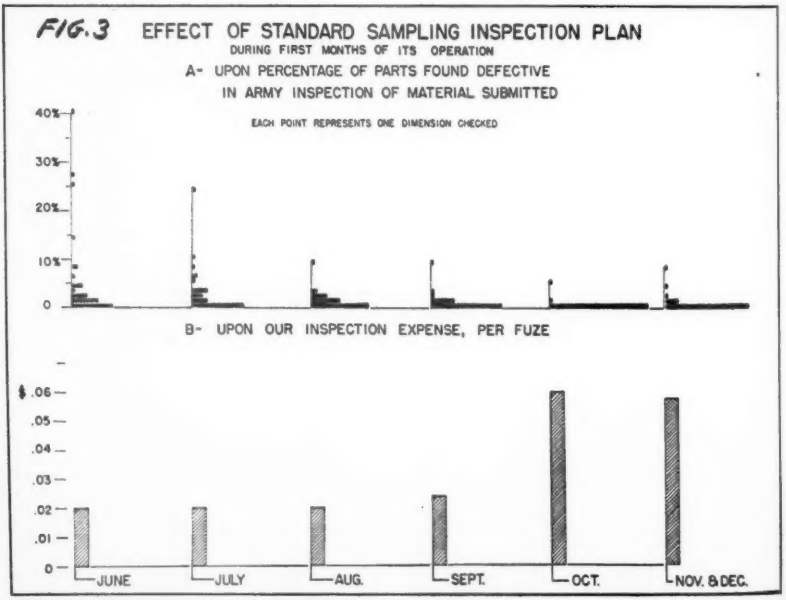
which has been determined by the manufacturer to be acceptable. It is, therefore, highly undesirable to have many lots rejected by the Army, not only because of economy but also because of standing with the Army. A complete record of lots submitted and results secured by the Army inspectors is maintained at the local Ordnance District and at the Office of the Chief of Ordnance, and a group of people spends its time in studying trends and comparing results between suppliers. The reputation of the supplier as developed from this information definitely affects both placing of orders and negotiations in regard to price.

In order to carry out this contract requirement, we have set up a system in which we precheck all the lots of material before submitting them to the Army. Here we use the system which is to be used by the Army except that our gages are set a little closer. With this precheck, about 2% of lots accepted by us are now rejected by the Army.

Figure 3 shows the history of decrease in Army rejections during the first few months of operation of this system. The percentage of lots rejected was reduced from about 45 to about 30 by improvements during June and July with our normal type of control. Introduction of the prechecking system made a further reduction to an average level of 15% for October, November and December, 1943, and since then by further detailed refinements to the present average of 2%.

It is worthwhile to note the change in costs of parts inspection also shown on Figure 3. The gains were made at terrific cost and by normal standards were not worth even a small fraction of the cost. However, the fuze is an extremely important device in time of war, and therefore the cost is justified.

The remaining apparent 2% discrepancy is partly inherent in the fact that the whole procedure depends on probability factors. Very slight differences in gaging or correspondingly slight differences in the parts between the two inspections will produce an appreciable discrepancy in results because of the sharp cutoff with this system and with the type of gages used. Differences of this sort are generally of no practical importance, so long as they are controlled, but can very easily necessitate screening under this Army system which



demands very high quality.

The salient question is as to the use which may be made of this technique in peacetime production operations.

Keeping both the simpler and more complex pieces in mind, the following general conclusions are indicated:

1. Lot-by-lot inspection provides a very satisfactory basis for scrutiny of quality of purchased materials and parts where the problems of acceptance for use and control of manufacturing quality are separated either in organization or by distance.
2. It contributes little to the control of machining due to various quite obvious shortcomings.
3. However, when accompanied by screening out of defectives where necessary, it brings obvious benefit to the subsequent assembly operations, and thus can sometimes be used to advantage in regular production as a sort of corrective to take care of the situation when the normal control of machining operations has faltered.

In many problems, the best solution may be a mixture of first-piece and patrol inspection procedures using statistical methods with some lot-by-lot inspection with screening where necessary.

For example, when a machine or group of machines is set up for continuous production on a single item, as happens in many cases in the domestic refrigeration operations, an inspection station will be located at the group of machines. At regular intervals, perhaps once an hour, a patrol inspector will visit this station, bringing with him checking masters to verify the gages which have been provided for joint use of the operator and the inspector. He will check pieces as they come from the machine and if they are found correct, dispatch the production since the last previous check to the next operation. If he finds defects or if there is any other cause for suspicion, he will, at the same time, sample the production which has accumulated since the last previous check. If this sample discloses more than a predetermined number of defects or defects of greater than a predetermined magnitude, that lot of work will be dispatched to a bench inspection location where the defectives will be screened out.

This solution will obviously not apply in all cases and requires further study wherever it is used. Measuring instruments should be provided for the operators and for the patrol inspectors; and fixed gages should be provided for screening.

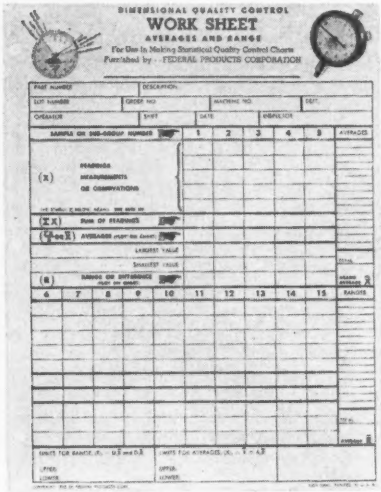
The advantages and opportunities with this mixture of patrol and lot inspection may be summed up as follows: An increase in the responsibility the operator feels for quality by maintaining a more complete and convincing picture of the work as it is produced; improvement in control over maintenance of equipment and tooling, through standardization of records in terms of quality obtainable; and improvement in the correlation of observations on consecutive groups of parts, so that any growth in defective work can not only be curbed before it becomes serious, but also be easily corrected by screening the material produced within a reasonably short period prior to discovery of the growth, resulting in definite improvement in the quality load of the products.

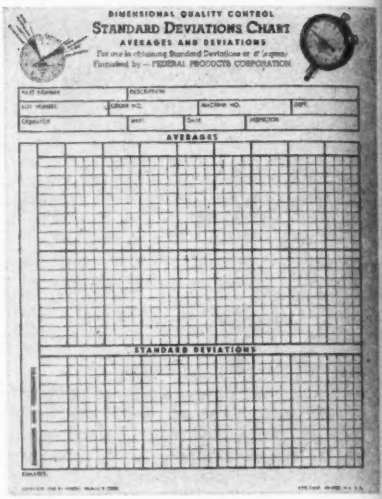
QUALITY CONTROL PRIMER

A most valuable and timely publication entitled "Dimensional Quality Control Primer" has been compiled by the Federal Products Corporation, manufacturers of inspection instruments. One purpose of their Primer is to function as an initial approach to a subject that is too often surrounded by a great deal of mathematical-statistical theory which is confusing to the uninitiated. Another purpose of the Federal Primer and the available work sheets is to dispel, by demonstration of working methods, a common misconception that statistical Quality Control is only suitable for, or practical in, large organizations.

Quoting from the Primer's "Foreword": "Past methods of inspecting dimensional quality have been confined largely to final inspection; that is, to inspection after each unit and the assembled units have been completed. This procedure, however, locks the barn door *after* the horse is stolen. Statistical

Reproductions of work sheets and chart sheets designed for inaugurating a system of statistical quality control. They are available from the Federal Products Corporation, Providence 1, Rhode Island, and are priced at $6.00 per thousand for the two necessary types of chart sheets and $2.50 per thousand for the work sheets. The charts and sheets are 8½" x 11" and are punched for three-ring binding.


DIMENSIONAL QUALITY CONTROL
WORK SHEET
AVERAGES AND RANGE
For Use in Making Statistical Quality Control Charts
Furnished by — FEDERAL PRODUCTS CORPORATION


DIMENSIONAL QUALITY CONTROL
STANDARD DEVIATIONS CHART
AVERAGES AND DEVIATIONS
For use in obtaining Standard Deviations or σ 'sigma'
Furnished by — FEDERAL PRODUCTS CORPORATION
AVERAGES
STANDARD DEVIATIONS

Quality Control locks the door *before* the horse is stolen; while the work is in production. It does not wait until after the mistakes are made but *locates them while they are being made.*"

The Primer gives further detailed explanations of Dimensional Quality Control and lists and explains its many additional advantages. A simplified method of applying statistical quality control to dimensions is introduced by showing how to establish a sampling procedure that leads to the formation and use of quality control charts. The system is successfully reduced to the use of only three charts whose make-up and function is explained with great detail and clarity in those sections of the Primer devoted to interpretation and use of the charts. The three charts are: a work sheet form, a Shop Analysis Chart, and a Standard Deviations Chart.

The detailed, step-by-step procedures outlined in the Primer give the knowhow of statistical quality control of dimensions in the taking of sample lots of workpieces while they are being produced. The immediate recording of the actual dimensions of these samples constitutes the data which, when used with predetermined formulas, will give an accurate report on the dimensional quality or accuracy of the work coming out of the machines. The system operates to give a warning when the quality is departing from the desired standards and also furnishes information which will suggest improvements in machine setup and tooling, and improvement changes in the original dimensional specifications. A free copy of Federal's Quality Control Primer may be had upon request to Federal Products Corporation, Dept. T, Providence 1, Rhode Island.
INFORM-A-GRAM KEY No. 4.8-C

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Railroad Apprentices

In view of the shortage of skilled labor in the railroad industry, a 6-page pamphlet has been made available containing useful information taken from the 1944 official Proceedings of the Master Boilermakers' Association. The skilled labor situation in the industry is described and the vital importance of apprentice training is emphasized. This bulletin may be obtained from Apprentice-Training Service, War Manpower Commission, Washington 25, D. C.

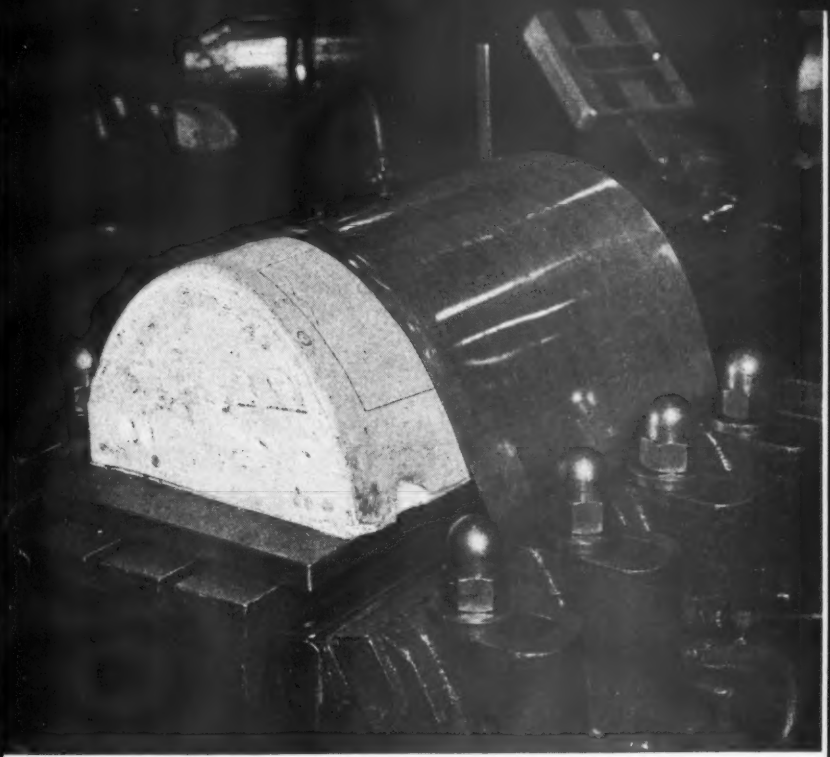


Fig. 1—For a simple "hump" stretching operation the stretch block may be formed to take several widths of material. Here the block is wider than the metal sheet. The sheet being formed is .025" Alclad 24S-T.

Stretch Blocks For Contoured Plane Skins

by Melvin Young
PLASTICS METHODS ENGINEER
The Glenn L. Martin Company

(Mr. Young is now in the United States Navy)

When the Navy Department awarded to The Glenn L. Martin Company, Baltimore, Md., a contract for twenty additional Mars planes,* the Tool Engineering Department began the biggest tooling program ever to be experienced at the Martin Company.

One of the many problems that were encountered in the tooling task was to

**The Mars, a cargo carrier converted from a long range patrol bomber, is operating with the Naval Air Transport Service in the Pacific.*

find an economical method to form the contoured skins of the ship.

Since there were only twenty ships to be built, it was necessary for the Tool Engineering Methods group to adopt a quick economical method to form these parts. Normal production methods, where large quantities of parts are fabricated, were out of the question. Dural and Kirksite stretch blocks were not practical, due to the many man-hours required to make this type of block and to critical shortages of these materials. Some type of plastic stretch block would serve the purpose very well but the engineers found that the cost of the phenolic resin would increase the cost of the tools too much to warrant the use of this type of material.

After an extensive survey had been conducted by the methods group, and the many proposed methods had been reviewed, it was decided that hydrostone, a gypsum cement, would be the material to use.

Hydrostone stretch blocks had been in service at the Martin Company for the past two years. This material was used extensively on PBM modifications to facilitate necessary engineering changes.

Hydrostone is a gypsum cement and is prepared in practically the same manner as plaster of paris. Hydrostone is the hardest and strongest of gypsum cements, possessing two to four times the strength and hardness of normal types of molding and pottery plasters. The ratio of water to hydrostone should be roughly 35 parts water to 100 parts of material, by weight. After the water is weighed, the hydrostone is sifted into the water evenly. When all of the gypsum cement has been added to the water, it should be left to soak approximately three to four minutes before it is mixed. After the wetting or soaking period has taken place, the mass must be mixed until it becomes a creamy mixture. If it appears to be too thin, additional hydrostone may be added. The thickening or creaming stage, more accurately described as the "period of plasticity", is utilized for the actual forming. At the correct thickening stage, determined by test, the material is then cast into a plaster mold and reinforced with long-fibre hemp and steel rods. After the hydrostone has set approximately one hour, a reinforcement base is attached to the block. To insure a level base on the stretch block and also provide a clamping device to anchor the block to the press, a three-quarter inch piece of masonite is attached to the bottom of the block.

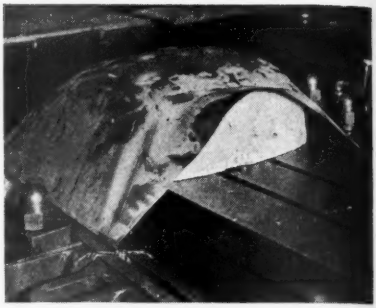
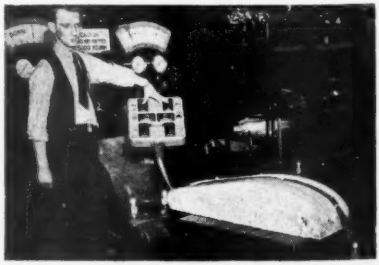


Fig. 2—A metal strip wider than the stretch block is used to form a compound curvature. The hydrostone surface provides excellent slippage necessary to avoid tearing of the metal.

The success of the stretch block when in operation depends on the technique with which the base is attached. One of the best methods is to prepare a small mix of hydrostone and apply it to the bottom of the stretch block. The three-quarter inch masonite base is then placed on the stretch block while the small mix of hydrostone is in the creamy stage. Large pattern makers' clamps are then used to pull the base down tightly on the block. Additional pressure is applied to the clamps to force out the excess hy-

Fig. 3—A narrow strip is being stretched in a recess of hydrostone block. The control panel is placed so that the operator can watch the entire operation.



drostone and insure a level surface between the base and the block.

After this mix of hydrostone has hardened, holes are drilled into the stretch block and one-half inch lag screws are used to secure the base to the block. The stretch block is then removed from the mold and the trim lines are scribed into it. When the block has been inspected, it is sent to the stretch press department for use. It is recommended that the gypsum block be left to

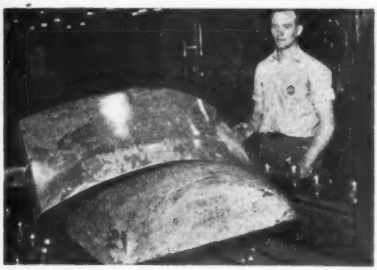


Fig. 4—The stretch formed sheet is being removed from the press. The masonite base provides a convenient clamping device for anchoring the block to the press.

cure or dry-out for a period of three days before using. However, if schedules demand it, the block may be used to form parts three to four hours after its removal from the mold.

When the stretch block is placed in position on the stretch press it is very important that the block be shimmed to index perfectly with the surface of the ram on which it will be attached. It was found that the few blocks which cracked did so because of improper shimming of the bases.

The forming characteristics of the hydrostone stretch blocks are also good. It is not necessary to use a lubricant with the hydrostone thus eliminating greasing of the blocks after each part is pulled. When rubber sheeting is used as a pad, two skins can be formed at one time.

Tests have been conducted to find the limits of the gypsum blocks. In practically every case over 1000 skins were formed on the blocks under test with the aid of the rubber pad. These blocks are still in service and have shown very little signs of wear.

Reprinted from the July, 1945, issue of Industrial Plastics.

Resin Coating Promises Food-Wrapping Protection

Application of the automotive finish resin, Duraplex C-49, to the newly developed self-sterilizing food wrappers is announced by the Resinous Products & Chemical Company of Philadelphia. The resin was selected for its chemical inertness, durability and pigment wetting and binding properties, and the finishes produced with the resin are noted for their water resistance, adhesion, flexibility and toughness.

These S-Coatings which are being manufactured on a commercial scale as a "Sterilite" product by the Shellmar Products Company, Mount Vernon, Ohio, differ from most antiseptic, germicidal and fungicidal agents because of their complete lack of solubility, toxicity and presence of taste and odors.

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Van Dorn Announces Midget Injection Machine

A small hand-operated injection molding machine, the "Midget Molder", has just been announced by The Van Dorn Iron Works Co., Dept. T, 2685 E. 79th St., Cleveland 4, O. It is offered as a low cost economical injection machine for testing small molds and single cavities. It should appeal to mold makers as a convenient tryout press, as well as to molders for testing new molds without disrupting production on larger presses. It also can be used for short run production.

The injection plunger is capable of exerting over 15,000 pounds pressure. The "Midget Molder" has a platen area of 8" x 8", with a mold opening of 4" over and above the 3" to 7" daylight adjustment for different size molds. Resistance heaters, plated inside and out, are used with built-in heater controls. Stainless steel heaters and plungers, ¾" and ½", are available as extra equipment. For experimental purposes, different lengths of heaters can be accommodated due to the adjustable plunger stroke.

The "Midget Molder" is opened and closed by a toggle mechanism. Maximum clamping pressure is assured by a toggle adjustment. The machine is capable of delivering a maximum shot of ¾ ounce.

INFORM-A-GRAM KEY No. F3-C

CARBIDE PINS FOR KNURLING TOOLS

The use of small Carboloy pins in place of the conventional steel pins formerly employed to mount knurling tools in their holders has enabled the Yale and Towne Manufacturing Company of Stamford, Conn., to virtually eliminate tool maintenance on the knurling operation in addition to increasing tool life at least 100 times.

Fig. 1—Knurling tool setup in which carbide pins replaced steel pins with a service life gain of better than 100 to 1.

The operation consists of putting a 4" long, medium knurl approximately $\frac{1}{32}$" deep on work pieces made of chrome-moly and other tough alloy steels as well as medium carbon steels. With the spindle of the lathe stationary, Fig. 1, the knurl is forced into the steel work piece to a depth of approximately $\frac{1}{32}$". The lathe spindle is then started, the proper knurling speed being around 150 SFPM, or 187 RPM for a work piece of 3" diameter. The knurling tool is fed 4" across the face of the work at .024" per revolution.

This method of initiating the knurl, although producing an extremely clean knurl, requires a high instantaneous pressure. Although the pins which held the knurl rolls in place in the knurl holders were made of either high speed steel, SAE 3140, or drill rod, the extremely high starting pressure caused the steel pins to wear rapidly. Usually they lasted on an average of somewhat less than one a day. The knurl rolls picked up steel from, and tore or "chewed" the pins so badly, Fig. 2, that the rolls jammed, sometimes even ruining both tool and work piece, before the machine could be stopped, resulting in considerable scrap and loss of time for repairs. Actually, the full time of one operator was required just to repair damaged knurling tools since the average breakage on these tools ran as high as 6 and 8 per day when steel mounting pins were used.

Fig. 2—Original steel pins averaged only about 1 day service.

Solid Carboloy standard precision boring bit blanks, $\frac{7}{8}$" long and $\frac{1}{4}$" in diameter, of grade 883 are used for the pins. Flats were ground on both ends of each pin, Fig. 3, and the pins were pressed into place in the knurling tool and held by set screws that bottomed on the ground flats.

Since the installation of the Carboloy pins in the knurling tools, Yale and Towne have experienced no trouble with the knurl rolls "chewing" the pins. In fact, the original carbide pins have already run in steady service for more than three months without replacement. This gives a current ratio of life of 100 to 1 over the previously-used alloy steel pins, a ratio which will probably be materially increased when the final life figures become available.

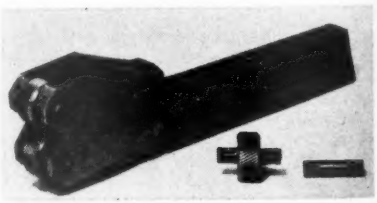


Fig. 3—Carbide pins, with a flat ground on each end for set screws, eliminated the trouble.

SPECIAL TOOLING FOR ROCKET NOZZLE PLATES

Special tooling and the conversion of standard machines into special machines to produce Rocket Shell Nozzle Plates for the Navy has been accomplished by Baker Brothers, Inc., Toledo 10, Ohio.

The nozzle plate, used in the 5" rocket shell, is 5" in diameter, has eight taper holes on a 3⅜" circle, each hole is 1¼" at large diameter of taper. Holes must be drilled, reamed, and a radius formed on the edge of each hole on both sides of the plate, with the holes held concentric.

To produce this part on a production

basis, Baker Brothers built two of their 3½ x 24 hydraulic feed, horizontal drilling, floor type units into a two-way opposed horizontal machine shown above. The machine is arranged as a special with a 24 spindle fixed center head at the right end of the machine and a 33 spindle fixed multiple head on the left end of the machine. A special automatic power index, 16 station work-holding trunnion type fixture is employed and is provided with an ejector for removing parts at the loading station. All operations are handled on this multi-operation machine at one chucking. At each cycle of the machine one part is produced with all operations in the eight holes completed. The machine is fully automatic in operation cycle and only requires the loading and unloading of the parts by the operator.

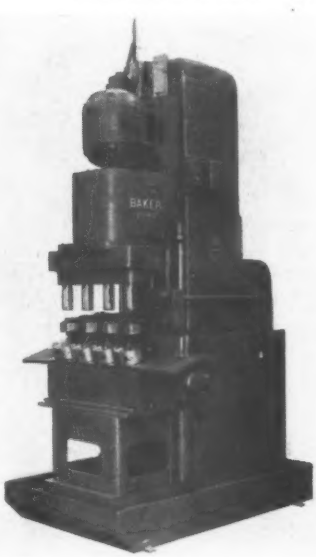
Another nozzle plate 5" in diameter, 1¼" thick requires eight taper holes spaced equally on a circle and drilled at an angle on the circle. Because the holes are on an angle, inclined at 25° from one side and 22° from the opposite, it was only possible to machine one hole in each part at a time.

The machine shown below is a Baker No. 26-HO Heavy Duty Vertical Hydraulic Feed Machine which was equipped with a four spindle fixed spindle head, and four 6" diameter three jaw automatic Genevia indexing chucks. The chucks are mounted at angles to allow for drilling and taper reaming the holes at the required angles. The holes are drilled from solid with special ground twist drills ground to a taper.

In handling the machine, the operator loads four parts, one in each chuck, starts the machine which continues in an automatic cycle until eight holes in each part are drilled. The work-holding chucks automatically index, while the cycle of the machine is controlled by means of an electric interlock. At the end of the cycle the operator unloads the finished parts, and reloads for the next cycle.

Literature on request from the company, attention Dept. TJ.

INFORM-A-GRAM KEY No. A63-C



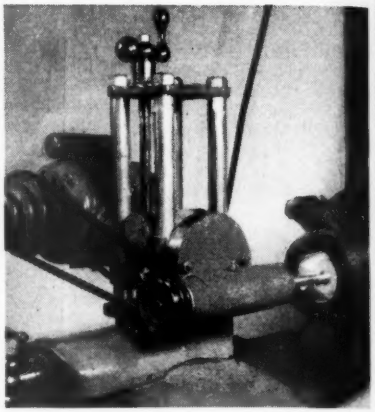
LATHE SETUPS FOR MILLING AND GRINDING

The Master Lathe Converter is a combination metal working machine tool, ruggedly constructed, compact and simple in design, especially adapted for maintenance, tool and experimental departments where a wide range of metal working operations are required. This equipment is particularly suitable for mobile repair units, and maintenance shops where weight and space are at a premium. Its simplicity in set-ups makes it easy to operate and affords an operator with the facilities to set up and perform practically any type metal working operation. It is limited only by the lathe on which it is used, since the lathe holds the workpiece and the converter performs the operation.

This machine is portable with interchangeable heads for milling operations, cylindrical or surface grinding, internal grinding, internal keyseating, dividing head for precision indexing, and miscellaneous arbors for adapting all standard milling cutters and tools. It requires only a moment to change the heads to convert it for the various types of operations. It is a complete motor driven unit within itself; used primarily in conjunction with engine lathes but occasionally on milling machines, planers, shapers, etc., as a vertical head. A geared Dividing head, 40 to 1 ratio, for precision indexing on a lathe is an important part of the equipment.

Further information and Catalog No. 10 upon request from Master Manufacturing Co., Dept. TJ, Hutchinson, Kan., or use our postage-free Inform-A-Gram.

To set up the converter, the tool post is removed from the T-slot in the compound rest of the lathe, an adapter bar is inserted, which is supplied with the converter, in the T-slot, two cap screws are tightened and the converter is ready to go to work. It may be mounted in any of three positions on the compound, or directly on the carriage with the compound rest removed.

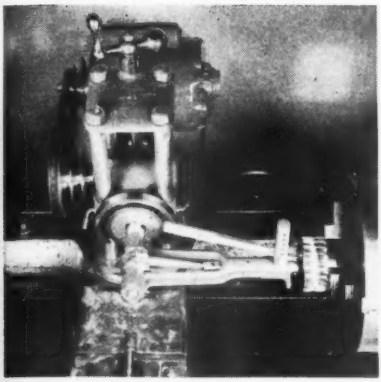


INTERNAL GRINDING. Internal grinding is illustrated above and is accomplished with the lathe converter by mounting the internal grinder head on the basic unit and with it grind any workpiece that can be revolved in a lathe. These internal heads are made with a taper spindle permitting grinding as small as 1" bores. Standard lathe feeds and speeds are used for feeding the grinder. The same head is interchangeable on other models and has a capacity for depth of 4¾" while model "M" has a capacity for grinding depths up to 6".

Internal grinding should be accomplished with the smallest diameter wheel possible. This gives less area of contact between the grinding wheel and the workpiece. Light cuts with rapid traverse gives best results. Chatter and rough finish are usually traced to too heavy a cut and too large diameter wheel.

INTERNAL KEYSEATING. The cutting of internal keyways in gears, pulleys, wheels, etc., is an operation that is difficult to perform in practically every shop, and which may be easily performed with the converter and internal keyseater.

The workpiece may be held in the

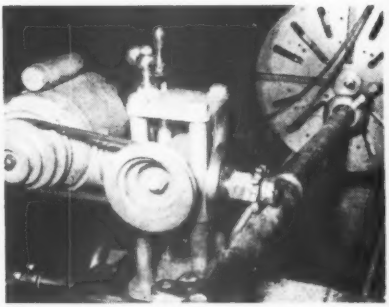


lathe chuck or clamped on the face plate, but in most instances the chuck is better as the set-up time is less. Large bored pieces should be held on the face plate.

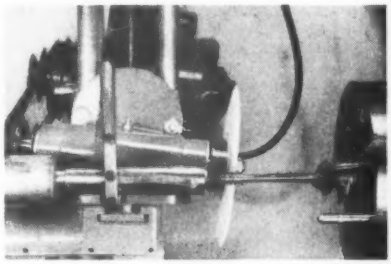
The bottom surface of the hole in workpiece must be chucked or held at least the depth of keyway above the bottom surface of the lathe spindle bore, as it is necessary that the mandrel with cutting blade work back and forth in the lathe spindle without cutting into it. This may be easily done with an independent jaw chuck by chucking off center, or if a universal chuck is used by blocking between workpiece and chuck jaw to hold off center. The arbor end of keyseater crank is screwed into the spindle of the converter, then the broach mandrel is moved into the bore of the workpiece and the mandrel aligned by adjusting compound of lathe.

The converter is adjusted vertically until the broach blade is level with the surface of the hole, then screwed down the depth of the keyway and the locking handle on the converter tightened. The broach casting should be against the work and the carriage tightened on lathe bed to prevent moving. The keyseater cuts on the draw stroke which hold broach casting against the work.

KEYWAYS IN TAPER SHAFTS. One of the set-ups to mill keyways in taper shafts with the lathe converter, is to mount the workpiece between lathe centers with taper end of the shaft toward the tail stock using an adjustable center in one of the T-slots in the face plate to accomplish leveling of top surface of taper with lathe bed. Another method is to hold the workpiece across



the face of the chuck, rotating the head stock spindle until the top surface of the taper is level with the lathe bed. The lathe spindle is then locked securely so that the work cannot turn. If the workpiece is long or a heavy cut is to be made, it is advisable to block up the outer end to give added support. The converter is mounted and the cutter aligned with the workpiece. After the cutter is aligned with the shaft, the compound must be tightened and carriage locked. The cutter is fed down to the desired depth of the keyway, vertical locking screws tightened on the converter and the cutter fed along the workpiece using the lathe cross feed.



THREAD GRINDING. This set-up shows Model "B" lathe converter with a 200 grit wheel mounted on universal grinding head grinding the threads on a 7-pitch Acme go-and-no-go thread gage. Note the setting of the universal head to the thread angle, the gage being held between lathe centers with a constant spring tension center used in the tail stock. The converter should be mounted so that the compound may be used for positioning the wheel.

INFORM-A-GRAM KEY No. F2-C

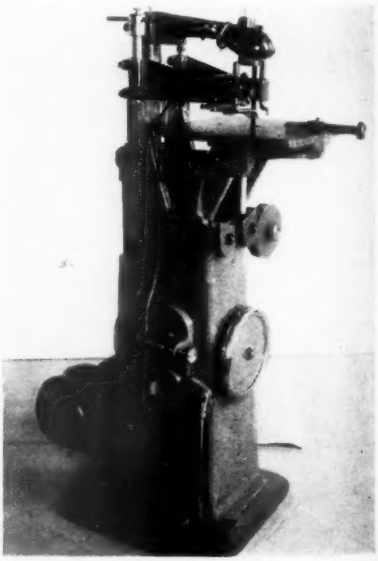
DIE MAKING MACHINES

The S-1 Bench Model illustrated above, with a standard overarm, 8½" throat, saws 8½" horizontally and through tool steel 1" thick. Both S-1 and the Heavy Duty Model shown herewith are produced by Oliver Instrument Co. Model S-1 has a standard, 10" sq table which tilts 10 degrees to the left, right and front and accommodates a screw feed sawing attachment. Attached directly to the upper and lower rams, the improved universal chuck firmly grips saws, lapping sticks and commercial hand files of any shape or size within its capacity. It holds rigidly in any position, all shapes of Oliver parallel machine files sized up to ½". The stroke length is 1⅜" with 400 spm capacity. The drive is furnished by a motor directly connected to the pinion shaft through an improved universal coupling. The hardened steel pinion engages a generated worm gear on the crank shaft. Power is furnished by a ¼ hp, standard motor with 110 or 220 V dc or a 25, 30, 50 or 60 cycle, single phase ac. The maximum speed is 1750 rpm.

Write Oliver Instrument Co., Dept. TD, 1436 E. Maumee St., Adrian, Mich., for further information and literature or use our postage-free Inform-a-Gram.

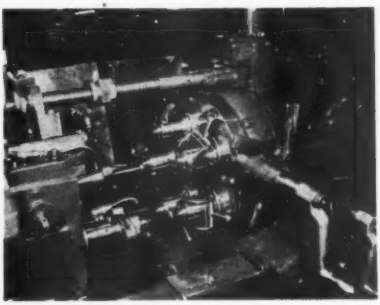
The Oliver Heavy Duty Die Making Machine saws metals of up to 3" in thickness and files heavier material with a shorter stroke which is adjustable to a 5" capacity with from 100 to 300 spm in six speeds. The clamps alone hold any type of parallel files or any size of saw. The reciprocating ram of 2" diam steel tubing has a 10" bearing. To it are rigidly connected the 2 arms which reciprocate the cutting tool and have vertically adjustable, universal clamps for close holding of the file or saw. The hinged upper arm which has means of straining the saw can be turned back or removed entirely. The files may be supported in both or either of the chucks. Positive mechanical drive is furnished to both upper and lower file holding arms. Saw guides which are provided above and below the table are easily adjusted or removed. A pump furnishing continuous air blasts always keeps the work clean.

INFORM-A-GRAM KEY No. 697-C



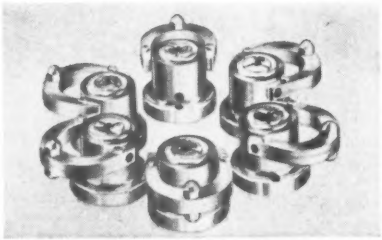
APPLICATIONS OF SPEED CHUCKS AND COLLET FIXTURES

Many combinations of standard machine tools and accessories do not always meet the demands of production schedules imposed on industry, as experienced in the war years just past. Ingenious men have been constantly at work endeavoring to find ways to reduce operating time, either through tooling, jigs or fixtures. Zagar Tool has contributed to this effort through the development of their indexing and holding fixtures which eliminates special tooling, special fixtures for individual jobs, and involved multiple setups. Going a step further, they have adapted their speed chuck and collet holding fixtures to special purpose and semi-automatic machines.



The photograph above illustrates the use of the Zagar Speed Chuck holding a small spindle while being hobbed on a Barber Coleman gear cutter. The speed chuck is mounted at an angle so that the operating handle clears the overarm. Instead of the conventional base mounting, the chuck yoke is mounted by pivoting through the handle near the bottom.

Three advantages accrue: (1) Small centerless work is held in a collet; (2) the entire fixture is mounted independently of the spindle and the fixture can be shifted slightly to make the collet run dead true; (3) the collet does not move lengthwise. Hence the small part is not moved from the center, as with a drawin collet. Neither is it pushed toward the center to mar the surface of the work.

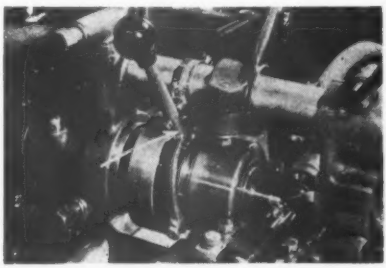


The other two photographs show six fixtures which were installed in a circle on a Goss & de Leeuw multiple-spindle chucking machine. The table rotates 1/6 of a revolution at each cycle. The tool spindles rotate, the fixtures stand still. When the indexing table indexes, it opens automatically and closes the collet fixture. Up to 16 tools can be used advantageously in a single setup.

Drawings and full engineering data on these speed chucks and collets will be furnished on request to Zagar Tool Co., Dept. TJ, 23880 Lakeland Blvd., Cleveland 17, Ohio, or use our postage-free Inform-A-Gram.

The overall height of this new low fixture from bottom of mounting base to top of collet is 3". A section 2¼" in diameter by ½" long protrudes beneath the mounting surface or the largest diameter of the fixtures, which is the locating boss in the indexing table.

INFORM-A-GRAM KEY No. 650-C



"STRIPPITS" UNITS

FOR PRESS WORK STRIPPING

This new, improved line of Strippits, designed for stripping metal from conventional dies, are applicable wherever spring pressures are required in a die for stripping work and scrap from conventional blanking and forming dies, or returning cam slides on underturning dies. By using Strippits in making a die, the punch holder or die shoe castings never have to be turned over after the back sides have been planed. All the machining is done from the face side.

Complete information is available by writing for catalog S from the Wales-Strippit Corp., Dept. TD, 345 Payne Ave., North Tonawanda, N. Y., or use our postage-free Inform-A-Gram.

Each Strippit is a spring, held compressed by means of a retainer which is telescopic, non-revolving and self-contained. One end of the Strippit has a projection with a screw thread by means of which the Strippit is held to the punch or die shoe casting. The other end has a tapped hole to accommodate the stripper screw which holds the stripper plate to the Strippit.

All Strippits of the same length have uniform stripping pressure which assures even stripping action over the entire plate regardless of how many Strippits are required, providing they are equally spaced around the die. Strippits standardize stripping pressures which produce easier, better operating dies.

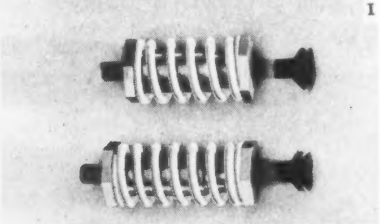
Strippits eliminate the many difficulties caused by the conventional method of applying stripper plates to punches and dies such as removing dies from the press to repair broken punches, broken springs or defective die steel.

Strippits are held compressed by a retainer, therefore, no pressure is exerted on the stripper plate until it moves into action. This feature reduces the necessary thickness of stripper plates. Strippits are easy to install. There are no springs to grind, no stripper bolts to make, no drilling and counterboring for the stripper bolts, and no boring of spring pockets.

Strippits are packed with lubricant for life. Initial loads range from 140 pounds on the 3" Strippit to 175 pounds on the 2".

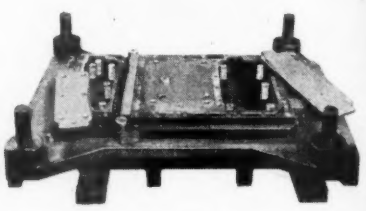
INFORM-A-GRAM KEY No. 60-C

1



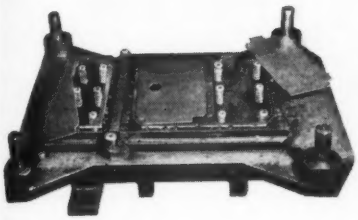
Showing the overall appearance of two different length Strippits. They are available in 2", 2½" and 3" lengths and may be used in combinations to provide 4", 4½", 5", 5½" and 6" lengths.

2



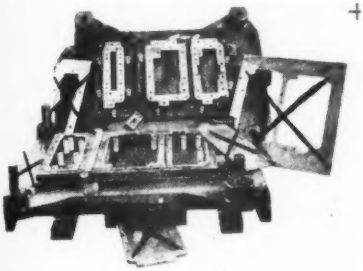
Illustrating the use of Strippits with stripper plates. During the operation of this die it was found to be advantageous to discontinue the use of stripper plates as shown in the next photograph.

3



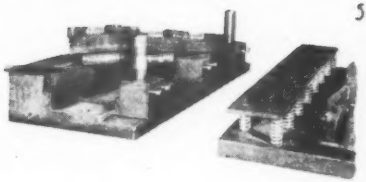
In place of the stripper plates in the foregoing illustration, punched out blanks are used. Note the center blank is elevated above the cutting edge of the die for easy, quick removal of the work from the die. This is slightly above the die cutting edges, and this elevation or position is maintained by placing washers under the Strippits when the die is made and then removing one washer every time the die steels are reduced by numerous sharpenings. Another advantage of using Strippits without stripper plates is the elimination of the binding of blanks against the inside of the die cutting edge as stripper plates tend to lock the work into the die when they press on the blanks, thus requiring considerable additional pressure to strip the work from within the die.

4



Photograph illustrates the stripper plates that are eliminated in this typical die using Strippits. The use of stripper plates with Strippits is for one purpose only—to eliminate any markings on the work. Strippits are uniformly located around the punch holder and die shoe to provide equal Strippit pressure.

5



Showing how Strippits are used for returning the cam slide on underturning dies. Strippits are screwed to lugs on the underside of slide. The slide is placed on the shoe with Strippits nesting in pockets. Strippits do not exert pressure until the slide moves inward when the pressure is exerted to return the slide. Strippits are also used for the pressure bar on the slide and the pressure pad on the punch holder.

6

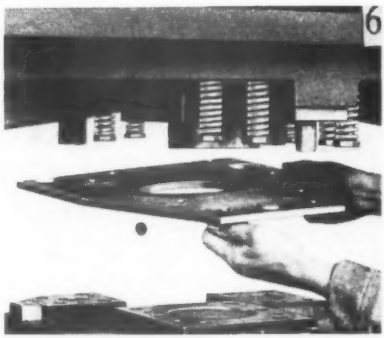


Illustration demonstrates the ease of removing a stripper plate from a punch by simply backing off the screws that hold the stripper plate to the Strippits. Replacing the stripper plate on the punch is accomplished just as easily and quickly. With Strippits it is possible to eliminate uneven stripping pressure caused by varying lengths of screws, depths of counterbored holes and pressures of springs generally found in ordinary dies. Punch holders and die shoe castings are more compact, with Strippits, resulting in cheaper and less complicated construction. The castings are lighter, cost less, easier to handle and easier to machine.

TDJ SHOP DATA SHEET NO. 1

TAP DRILL SIZES FOR TAPPING 75 PERCENT THREAD DEPTH MACHINE SCREW THREADS

Tap Size	Threads per in.	Hole Dia.	Drill Size
0	80	.048	3/64
1	72	.060	53
1	64	.058	53
2	64	.071	50
2	56	.069	50
3	56	.082	45
3	48	.079	47
4	48	.092	42
4	40	.088	43
4	36	.085	44
5	44	.103	37
5	40	.101	38
5	36	.098	40
6	40	.114	33
6	36	.111	34
6	32	.108	36
7	36	124	1/8
7	32	.121	31
7	30	.119	31
8	36	.137	29
8	32	.134	29
8	30	.132	30
9	32	.147	26
9	30	.145	27
9	24	.136	29
10	32	.160	21
10	30	.158	22
10	24	.149	25
12	28	.181	14
12	24	.175	16
14	24	.201	7
14	20	.193	10
16	22	.224	2
16	20	.219	7/32
16	18	.214	3
18	20	.245	D
18	18	.240	B
20	20	.271	I
20	18	.266	17/64
22	18	.292	L
22	16	.285	9/32
24	18	.318	O
24	16	.311	5/16
26	16	.337	R
26	14	.328	21/64
28	16	.363	23/64
28	14	.354	T
30	16	.389	25/64
30	14	.380	V

ROLLER LAPPING MACHINE

The Spitfire Roller Lapping Machine has succeeded in greatly simplifying the process of lapping or polishing round plugs, pins or rods to a high degree of accuracy and a highly polished finish.

The most prevalent method of lapping or polishing round plugs has been to use a ring lap, consisting of a split disk of cylindrical cast iron, with a hole in the center, fitted into a ring in which are mounted adjusting screws.

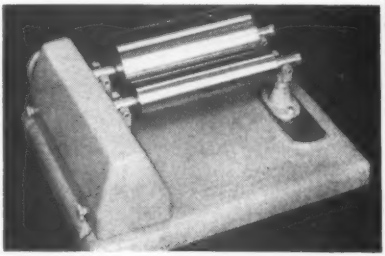
Spitfire Tools, Inc., has been making plug gages for various manufacturers for some time. The old ring lap method of lapping these plug gages was so inefficient and expensive that their engineering department developed the Spitfire Roller Lapping Machine to replace this old method in their own shop. The machine developed was so simple, foolproof, efficient and well-liked by their gagemakers and toolmakers that they decided, after a considerable testing period, to place it on the market.

The Spitfire Roller Lapping Machine consists essentially of two precision ground cast iron rollers, with shafts extending on both sides, revolving in adjustable bearings. One roller is approximately 3" dia x 12" and the other roller is 6" dia x 12". Both rollers, by means of a worm gear drive, are made to rotate in the same direction (away from the operator at the top of the rollers) at the same number of rpm, which rpm may be varied by means of a four-step pulley. The rollers may be easily adjusted or moved apart to accommodate work as great as 6" diameter.

The rollers are charged with the proper abrasive compound by running the machine and daubing compound on the rollers and spreading evenly with wet fingers until fully charged.

It has been found the most economical procedure is to grind the plug or pin within .0002" to .0004" of finished size without any deep grinding marks or scratches and then finish by lapping down to size. The plug or pin must be ground round as the roller lapping machine will not lap round a plug or pin which is ground out of round. The plug or pin may be lapped to size as accurately as the operator can measure.

After starting the machine the work is placed between the rollers, and by use of a "V" notched fiber stick, pressure is



applied to the plug or pin by moving it slowly and uniformly from side to side across the workpiece. If it is desired to lap a small amount of any particular section of the plug or pin, the fiber stick is held longer on that section. The friction of the rollers on the workpiece causes it to revolve, and the differential in surface speed of the rollers causes a lapping action on the work.

Plugs or pins, with shoulders larger than the diameter to be lapped, may be lapped by allowing the shoulder to hang over the end of the rollers. Slightly tapered plugs or pins may be lapped almost as easily as straight ones. The customary method of lapping plugs and pins is by chucking them, and using a ring lap. This method has the disadvantage of the time required to make the ring lap; limit of range of each size; frequent adjustments during the lapping operation; heating of ring lap to the point that the operator cannot hold it in his hands; and the workpiece becoming so hot that it has to cool before accurate measurements can be made.

These and other disadvantages are eliminated by the Spitfire Roller Lapping Machine. For further information write Spitfire Tools, Inc., 2931-35 N. Pulaski Rd., Chicago 41, Ill. Dept. RLM.

INFORM-A-GRAM KEY No. E98-C

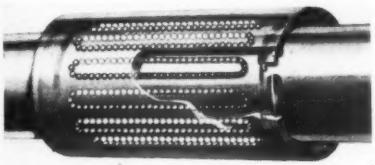
TDJ SHOP DATA SHEET NO. 2

TAP DRILL SIZES FOR TAPPING 75 PERCENT THREAD DEPTH US AND SAE STANDARDS

Tap Size	Threads per in.	Hole Dia.	Drill Size	Tap Size	Threads per in.	Hole Dia.	Drill Size
1/16	72	.049	3/64	9/64	32	.110	35
1/16	64	.047	3/64	5/32	40	.132	30
1/16	60	.046	56	5/32	36	.129	30
5/64	72	.065	52	5/32	32	.126	1/8
5/64	64	.063	1/16	11/64	36	.145	27
5/64	60	.062	1/16	11/64	32	.141	9/64
5/64	56	.061	53	3/16	36	.161	20
3/32	60	.077	5/64	3/16	32	.157	22
3/32	56	.076	48	3/16	30	.155	23
3/32	50	.074	49	3/16	24	.147	26
3/32	48	.073	49	13/64	32	.173	17
7/64	56	.092	42	13/64	30	.171	11/64
7/64	50	.090	43	13/64	24	.163	20
7/64	48	.089	43	7/32	32	.188	12
1/8	48	.105	36	7/32	28	.184	13
1/8	40	.101	38	7/32	24	.178	16
1/8	36	.098	40	15/64	32	.204	6
1/8	32	.095	3/32	15/64	28	.200	8
9/64	40	.116	32	15/64	24	.194	10
9/64	36	.114	33				

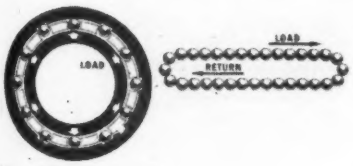
NEW BALL BUSHING

A new Ball Bushing that permits unlimited travel of reciprocating mechanical members has been developed by Thriftmaster Products Division of Thomson Industries, Inc. The Ball Bushing can be produced to fit either round,

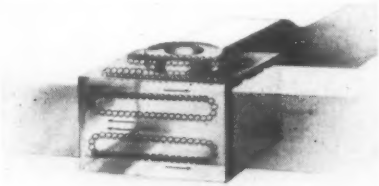


square or variations of these shapes. The advantages gained from the use of ball bearings for rotating parts can thus be now obtained on sliding members.

Basically, the Ball Bushing contains within it a series of ball circuits. One side of the circuit carries the bearing load with the other side returning the balls in a clearance provided in the outer race member of the bushing. Unusually free movement is obtained because of the maximum elimination of friction. The continuous bearing prevents cocking or binding on the shaft because the bearing balls remain constantly centered under load. Rolling contact plus sealed-in lubrication enables the bushing to give a long life of anti-friction precision alignment.



The system of ball circuits can be infinitely varied for varying load capacities and shapes of bearing members. Thus it is possible to have a bearing of considerable length or of a square, hexagonal or octagonal section. This longitudinal ball bearing has been under development for several years, and is to be identified in marketing with the trade name "BALL BUSHING". Results to be obtained from the use of Ball Bushings will be a substantial reduction in the size, weight, and cost of machinery and equipment. Such savings will accrue from the use of smaller drive motors, gears, linkages and in the normally greater operating economy due to re-



duced weight and longer life of mechanisms. Thriftmaster Products Division of Thomson Industries, Inc., Dept. J, 29-05 Review Ave., Long Island City, N. Y., will furnish further information.

INFORM-A-GRAM KEY No. C45.5-C

★

Sale of Molds Under MPR 581

By Amendment 2 to MPR 581, effective August 4, 1945, OPA has removed the existing duplication of regulations covering the sale of molds, dies, jigs, fixtures, gages and special machinery which had been under both RMPR 136 and MPR 581. MPR 581 is shorter and simpler than RMPR 136 and groups in several industries, including the National Tool & Die Manufacturers Association, have asked to be placed exclusively under MPR 581.

The pricing provisions of the two regulations are practically identical. However, MPR 581 requires that each firm's pricing method be filed with the OPA district office. This is sufficient if 1944 sales of all special tooling and all industrial services (fabrication, repair or maintenance of metal products) were less than $75,000, otherwise reports must be filed with the Machinery Branch, Office of Price Administration, Washington 25, D. C. Any firm which was exclusively under RMPR 136, and did not file, will be wise to file as soon as possible.

TDJ SHOP DATA SHEET NO. 3

DRILL SIZES FOR TAPPING 75 PERCENT THREAD DEPTH
US AND SAE STANDARDS

Tap Size	Threads per in.	Hole Dia.	Drill Size
1/4	32	.220	7/32
1/4	28	.215	3
1/4	27	.214	3
1/4	24	.209	4
1/4	20	.201	7
5/16	32	.282	9/32
5/16	27	.276	J
5/16	24	.272	I
5/16	20	.264	17/64
5/16	18	.258	F
3/8	27	.339	R
3/8	24	.334	Q
3/8	20	.326	21/64
3/8	16	.314	5/16
7/16	27	.401	Y
7/16	24	.397	X
7/16	20	.389	25/64
7/16	14	.368	U
1/2	27	.464	15/32
1/2	24	.460	29/64
1/2	20	.451	29/64
1/2	13	.425	27/64
1/2	12	.419	27/64
9/16	27	.526	17/32
9/16	18	.508	33/64
9/16	12	.481	31/64
5/8	27	.589	19/32
5/8	18	.571	37/64
5/8	12	.544	35/64
5/8	11	.536	17/32
11/16	16	.627	5/8
11/16	11	.599	19/32
3/4	27	.714	23/32
3/4	16	.689	11/16
3/4	12	.669	43/64
3/4	10	.653	21/32
13/16	12	.731	47/64
13/16	10	.715	23/32
7/8	27	.839	27/32
7/8	18	.821	53/64

Crusher Roll Profiling

(CONTINUED FROM PAGE 118)

A very fine feed should always be used when advancing into the grinding wheel. Some wheels respond better to dry crushing and some better to wet crushing. The nature of the bond is probably the deciding factor. In crush dressing a wheel that is used with a coolant, the wheel should be spun as dry as possible before crush forming. An extremely wet wheel will sometime fracture out or chip. Wheels running in a mixture of kerosene and base oil give the finest and sharpest profiles.

Roll Crushing for Centerless Grinding

The writer, from preliminary experiments with a centerless grinder, believes that a master roll swung between centers on a guide blade can be used to crush form centerless grinding wheels. In the first attempts, a freely rolling crush roll was placed on a guide slightly below center with the control wheel revolving in the opposite from the normal rotation by having the current reversed on the three phase motor. To overcome the heavy inertia of the heavy centerless grinding wheel and its belting to the motor, the wheel was revolved slowly by a crank as the roll was forced in to make friction contact. The roll drove the grinding wheel and began to impress its form. However, when the control wheel was backed away the roll fell back onto the grinding wheel and chipped the otherwise perfect form. Thus by swinging the roll between centers on a blade adapter, this danger could be avoided. The writer is having such a blade constructed and will report further in a subsequent issue of the Tool & Die Journal on his findings.

The writer wishes to conclude with the statement that crush forming of grinding wheels is still in the experimental stage as to his applications. However, enough experience has been gained to assert that it certainly seems a better high production tool than the cam and follower diamond dressing attachments. It also seems to be more adaptable to the more difficult contours. The very simplicity of the application should lend itself to many a tool room and production problem.

Carbide Tipped Milling Cutters and End Mills

Nelco Tool Co. of Brooklyn, N. Y., is manufacturing a new line of carbide tipped cutters and end mills designed for machining all metals and plastics. Included in this line are two and four flute carbide end mills from ¼" diameter up

to 2", large end mills up to 5" diameter with No. 50 NMTB shanks, shell end mills, face mills, slotting cutters and half side mills up to 8" in diameter. The bodies of the cutters are a special alloy casting having extremely high strength and are purposely designed heavy to create a flywheel action—an 8" Nelco face mill weighs 25 lbs. Extremely heavy carbide tips are employed to withstand shock, improve tool life and permit many regrinds before new tips must be brazed in. The tools are manufactured for mounting on standard No. 50 NMTB spindles or standard milling cutter arbors. The design also permits steel to be successfully milled on machines of old design or low powered machinery where present carbide cutters will not operate. A descriptive circular is available from Nelco Tool Co., Inc., 370 Hamilton Ave., Dept. TJ, Brooklyn 31, N. Y.

INFORM-A-GRAM KEY No. E72-C

★

6th ARMY-NAVY "E" AWARD for Handy & Harman

G. H. Niemeyer, President of Handy & Harman, New York, has recently announced that the company is the first in the precious metal field to fly an Army-Navy "E" pennant with five stars. He said a further outstanding achievement was that although the company's production is confined to alloys containing precious metals they are one of the very few in the whole nation to win 6 "E" awards.

TDJ SHOP DATA SHEET NO. 4

DRILL SIZES FOR TAPPING 75 PERCENT THREAD DEPTH
US AND SAE STANDARDS

Tap Size	Threads per in.	Hole Dia.	Drill Size
7/8	14	.805	13/16
7/8	12	.794	51/64
7/8	9	.767	49/64
15/16	12	.856	55/64
15/16	9	.829	53/64
1	27	.964	31/32
1	14	.930	15/16
1	12	.919	59/64
1	8	.878	7/8
1 1/16	8	.941	15/16
1 1/8	12	1.044	1 3/64
1 1/8	7	.986	63/64
1 3/16	7	1.048	1 3/64
1 1/4	12	1.169	1 11/64
1 1/4	7	1.111	1 7/64
1 5/16	7	1.173	1 11/64
1 3/8	12	1.294	1 19/64
1 3/8	6	1.213	1 7/32
1 1/2	12	1.419	1 27/64
1 1/2	6	1.338	1 11/32
1 5/8	5 1/2	1.448	1 29/64
1 3/4	5	1.555	1 9/16
1 7/8	5	1.680	1 11/16
2	4 1/2	1.783	1 25/32
2 1/8	4 1/2	1.909	1 29/32
2 1/4	4 1/2	2.034	2 1/32
2 3/8	4	2.131	2 1/8
2 1/2	4	2.256	2 1/4
2 5/8	4	2.381	2 3/8
2 3/4	4	2.506	2 1/2
2 7/8	3 1/2	2.597	2 19/32
3	3 1/2	2.722	2 23/32
3 1/8	3 1/2	2.847	2 27/32
3 1/4	3 1/2	2.972	2 31/32
3 3/8	3 1/4	3.075	3 1/16
3 1/2	3 1/4	3.200	3 3/16
3 5/8	3 1/4	3.325	3 5/16
3 3/4	3	3.425	3 7/16
3 7/8	3	3.550	3 9/16
4	3	3.675	3 11/16

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and
HACK SAW BLADES ***OF PROVEN***
QUALITY AND PERFORMANCE

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W. O. BARNES CO., INC.

DETROIT 14, MICHIGAN

TDJ SHOP DATA SHEET NO. 5

DECIMAL EQUIVALENTS FOR NUMBER/LETTER SIZES OF TWIST DRILLS AND DRILL ROD

Drill and/or Rod	Drill Size	Rod Size	Drill and/or Rod	Drill Size	Rod Size	Drill and/or Rod	Drill Size	Rod Size
1	.2280	.227	37	.1040	.103	73	.0240	.023
2	.2210	.219	38	.1015	.101	74	.0225	.022
3	.2130	.212	39	.0995	.099	75	.0210	.020
4	.2090	.207	40	.0980	.097	76	.0200	.018
5	.2055	.204	41	.0960	.095	77	.0180	.016
6	.2040	.201	42	.0935	.092	78	.0160	.015
7	.2010	.199	43	.0890	.088	79	.0145	.014
8	.1990	.197	44	.0860	.085	80	.0135	.013
9	.1960	.194	45	.0820	.081			
10	.1935	.191	46	.0810	.079	A	.234	.234
11	.1910	.188	47	.0785	.077	B	.238	.238
12	.1890	.185	48	.0760	.075	C	.242	.242
13	.1850	.182	49	.0730	.072	D	.246	.246
14	.1820	.180	50	.0700	.069	E	.250	.250
15	.1800	.178	51	.0670	.066	F	.257	.257
16	.1770	.175	52	.0635	.063	G	.261	.261
17	.1730	.172	53	.0595	.058	H	.266	.266
18	.1695	.168	54	.0550	.055	I	.272	.272
19	.1660	.164	55	.0520	.050	J	.277	.277
20	.1610	.161	56	.0465	.045	K	.281	.281
21	.1590	.157	57	.0430	.042	L	.290	.290
22	.1570	.155	58	.0420	.041	M	.295	.295
23	.1540	.153	59	.0410	.040	N	.302	.302
24	.1520	.151	60	.0400	.039	O	.316	.316
25	.1495	.148	61	.0390	.038	P	.323	.323
26	.1470	.146	62	.0380	.037	Q	.332	.332
27	.1440	.143	63	.0370	.036	R	.339	.339
28	.1405	.139	64	.0360	.035	S	.348	.348
29	.1360	.134	65	.0350	.033	T	.358	.358
30	.1285	.127	66	.0330	.032	U	.368	.368
31	.1200	.120	67	.0320	.031	V	.377	.377
32	.1160	.115	68	.0310	.030	W	.386	.386
33	.1130	.112	69	.0292	.029	X	.397	.397
34	.1110	.110	70	.0280	.027	Y	.404	.404
35	.1100	.108	71	.0260	.026	Z	.413	.413
36	.1065	.106	72	.0250	.024			

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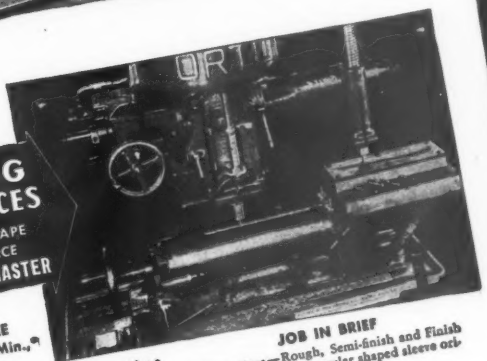

PROFILING *TWO* ORIFICES
OF IRREGULAR SHAPE
In TUBULAR PIECE
From **ONE FLAT MASTER**

SIX Operations Completed on ONE Machine in 40 Min.,* Floor to Floor

Gorton Tracer-Control Duplicating provides a simple, fast and accurate means for machining irregular shapes in parts like this Bronze Recoil sleeve shown above. Specifications for this job called for an orifice on opposite sides of the sleeve.

Both orifices required a rough, semi-finish and finish cut—the latter with a ¼" diameter end mill to produce ⅛" radii at the two corners. Only one set-up is necessary to complete the six operations (3 cuts around each of two orifices) accomplished with a high degree of uniform accuracy, in 40 minutes, floor-to-floor time.

The simplicity of Tracer-Controlled operation permits even the most difficult work to be accomplished by inexperienced help.

*NOTE—Time greatly reduced in other plants by using a battery of six or more Gorton Duplicators in multiples of three (1 for each cut) eliminating ALL cutter changes.

JOB IN BRIEF

6 Operations—Rough, Semi-finish and Finish Milling of *TWO* irregular shaped sleeve orifices.

Material—Bronze.

Cutters—(only 3 needed)—Four-flute, fast spiral end mill, 7/16" diameter, two End Mills, ⅜" and ¼" diameter.

Speed—1900 r.p.m.

Feed—Manual.

Production—40 minutes per sleeve.

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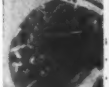
The Right Size and The Right Type of Machine for Every Job
From 2 oz. to 2 Ton

DIE BLOCKS

Tracer-Controlled MILLING

Tracer-Controlled DUPLICATING

Tracer-Controlled ENGRAVING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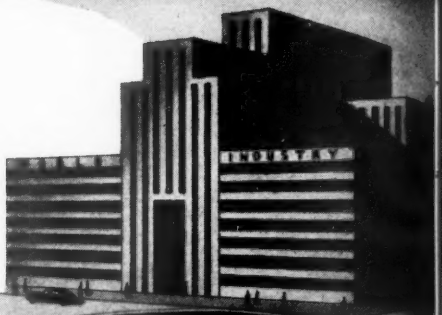
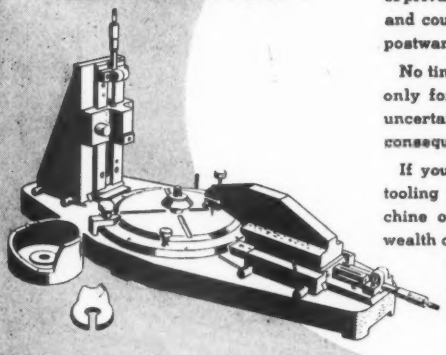


TIME *was never more precious!*

Industry must act NOW!



NOT ONLY JOBS, but the very future existence of private industry depends upon the speed, vision and courage with which industry achieves peak postwar production and employment.

No time dare be lost... too much is at stake... only foresighted and prompt action will avert uncertainty, fear, hoarding and all the chaotic consequences.

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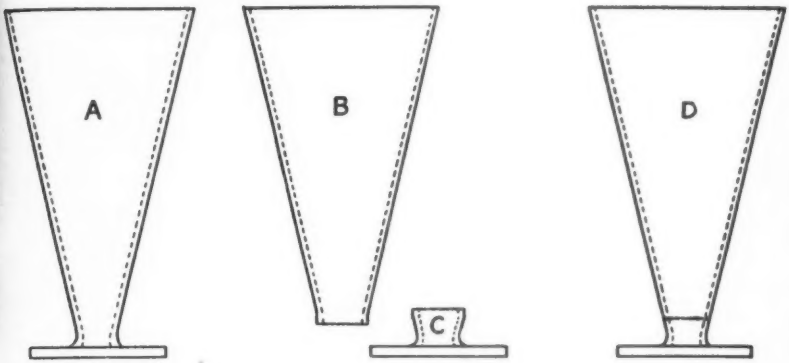


Recent experience in redesign of a munitions item demonstrates how advantage can frequently be taken of available shapes and how the combination of available shapes with small stampings often turns out to be the best solution for the production problem. Here is shown schematically the change in design which made it possible to dispense with a large amount of machine work, with a consequent improvement in production rate. The part shown at "A" was originally designed as a hollow forging which required a large amount of machining to reduce the wall thickness to the specified dimension. In order to speed up production and lower the cost, a study was made of the possibility of fabricating it by resistance welding. It would be quite natural to consider first the possibility of sectioning the piece longitudinally and flash welding two stamped sections together. This, however, would have involved some difficult problems of die construction for both the stamping operations and the welder. A better method consisted of flash welding two pieces of the general shape shown in "B" and "C". Part "B" was easily made by taper swaging the required lengths of seamless steel tubing of the correct outside diameter and wall thickness. At the small end of the taper, there is provided a straight tube section, slightly greater in length than the amount of material that would be lost in the flashing and push-up. Part "C" was produced as a stamping from material of the same wall thickness as the tube. This part also has a straight tube section corresponding to that of part "B", to allow for flashing and push-up. In other words, the two parts were identical in section at the areas where they were to be joined, and therefore presented satisfactory conditions for flash welding. The assembly reproduced the shape and dimensions of the original part as shown at "D". The removal of the flash after welding is only a minor operation compared to the amount of machine work necessary when this part was made from a forging.

★

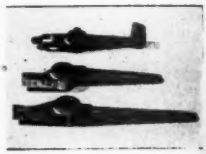
Federal Field Service

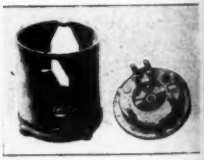
The Federal Products Corporation, manufacturers of precision measuring instruments, has set up a Field Engineering Service Department. Knowledge and experience in the use of inspection equipment vary greatly. Too often an inspector is found using an undesirable gage or making improper use of the correct gage. This new service provides the experience of field servicemen who, because of their contact with many gaging requirements and problems covering a wide variety of applications, can be of help to users of their instruments. Their services are available through local Federal representatives.

DIECASTING DIGEST

VIII — Die Castings Replace Forgings, Sand Castings and Permanent Mold Castings

More and more non-ferrous alloy parts, formerly made by forging, sand casting or permanent mold casting, are now being die cast to satisfy demands for rapid production, dimensional accuracy and best possible performance. For instance, by die casting the three links shown below, the Sperry Gyroscope Company saved weeks of time and obtained aluminum parts fully as satisfactory as those previously made by forging. Such parts are made on Lester-Phoenix die casting machines by "slow-squeeze" injection, which packs metal into the die at comparatively low speed, permitting escape of air ahead of the metal, and then applies pressure (up to 33,000 psi) on the metal as it chills. The other two aluminum die cast parts shown are a chassis (left) and a bracket for a Sperry stabilizing unit, replacing sand castings.





Lester-Phoenix high-pressure die casting machines have demonstrated that die castings with strength and physical characteristics heretofore considered impossible can now be produced uniformly day after day.

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Die Casting Data

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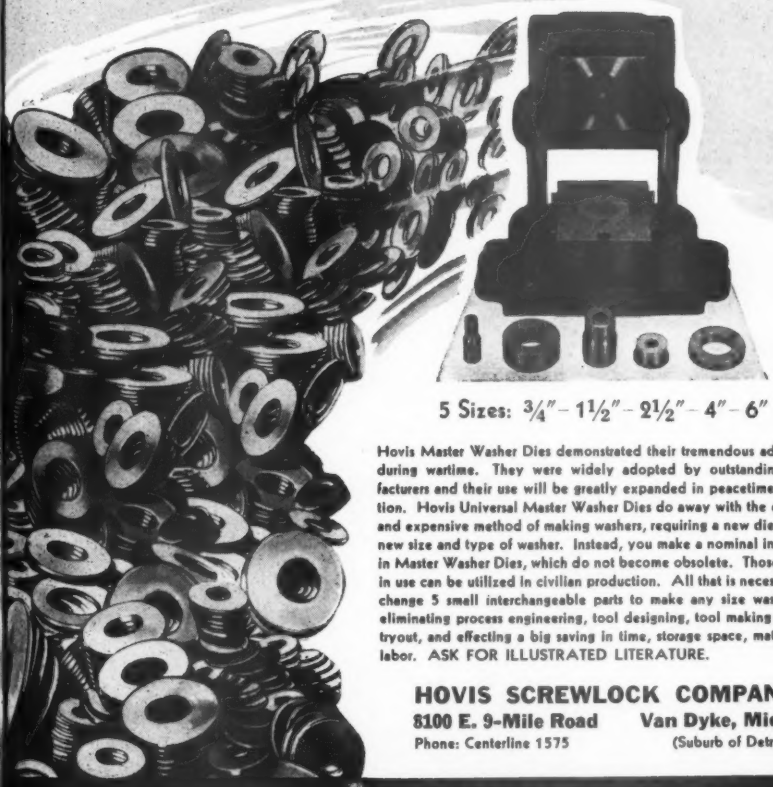
Geared to POST-WAR PRODUCTION



5 Sizes: 3/4" - 1 1/2" - 2 1/2" - 4" - 6"

Hovis Master Washer Dies demonstrated their tremendous advantages during wartime. They were widely adopted by outstanding manufacturers and their use will be greatly expanded in peacetime production. Hovis Universal Master Washer Dies do away with the old, slow and expensive method of making washers, requiring a new die for each new size and type of washer. Instead, you make a nominal investment in Master Washer Dies, which do not become obsolete. Those already in use can be utilized in civilian production. All that is necessary is to change 5 small interchangeable parts to make any size washer, thus eliminating process engineering, tool designing, tool making and tool tryout, and effecting a big saving in time, storage space, material and labor. ASK FOR ILLUSTRATED LITERATURE.

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HOVIS UNIVERSAL MASTER WASHER DIES

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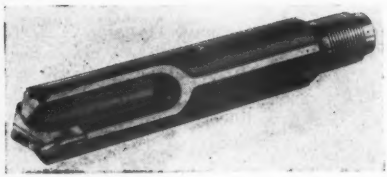


A NEW PLASTIC COATING for the protection of gaging surfaces of plug, thread, and special gages has been developed by Jansson Gage Co. Dipping the gage in Jan-Seal forms a tailor-fitted cover over the gaging surface which keeps the tool in perfect condition during shipment and storage. It is easily removed and replaced after use, eliminating the necessity of coating the gage with grease and then wiping it off. Jan-Seal affords protection against rust and corrosion and to a considerable extent against damage from dropping or being struck. Jan-Seal protection is furnished on all Jansson thread plug gages and on special gages where practical. JANSSON GAGE CO., who also manufacture a complete line of steel and carbide gage blocks, sine bars, vernier calipers and vernier height gages, will send additional information on request. Their address is 19208 Glendale Ave., Dept. TDJ, Detroit 23, Mich.

INFORM-A-GRAM KEY No. 1-C

MULTI-TIP DEEP HOLE DRILL. This tool which embraces all the advanced features of the conventional deep hole drill is produced by CONNER TOOL & CUTTER CO., Dept. TD, 5555 Conner Ave., Detroit 13, Mich. Entering around the outside of the drill, the coolant flushes the chips back through the shank's hollow center. The interchangeable HS drill tips cost only a fraction of a complete HS drill; the drill can be sharpened without removing the head from the shank; and the head remains in service while by use of the ordinary surface grinder cutter the cutting edge and chip breakers of spare tips are easily reground. The hard stellite strips, presenting six radial points of support at the cutting edge, offer unusual resistance to abrasion and further, may be reconditioned after the same amount of use that would render an average drill worthless. The heat treated alloy steel body, with only hard drill tips and wear strips, practically eliminates breakage at the head.

INFORM-A-GRAM KEY No. 944-C

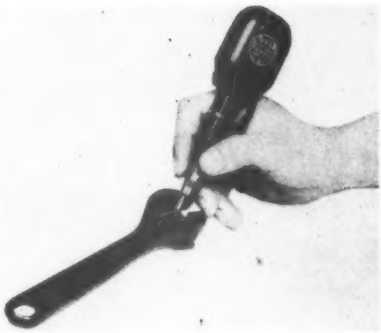
HAND POWER LIFTER. A built-in winch and cable for removing dies from racks or presses are especially useful equipment of

this lifter which is a product of ECONOMY ENGINEERING CO., Dept. TJ, 2659 W. Van Buren St., Chicago 12, Ill. Turning the winch, as illustrated, pulls the die onto the machine's platform for transferral to the press bed. The automatic floor lock binds the machine solidly to the floor thus preventing machine movement with the shifting weight of the die. The steering lever automatically raises the machine off its feet and turns it in a full 180 degree arc to facilitate moving the machine through narrow aisles. The capacity of the machine is 2000 lbs, its overall is 9 ft, 1 in. and height of the platform lift is 6 ft above floor level.

INFORM-A-GRAM KEY No. 277-C

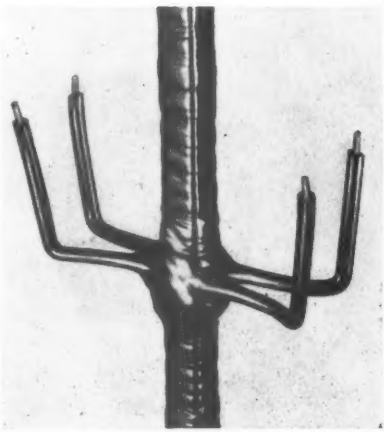
FOUNDRY FLASKS. Fabricated from hot rolled steel, heat-treated after welding to normalize construction and insure equal stress, the new Algoma Foundry Flasks are built to give long life under the toughest foundry conditions. They are designed to be installed with straight or cut-to-pattern flash bars according to specification. Bars are full welded in place. These foundry flasks are manufactured by ALGOMA PRODUCTS, 3080 E. Outer Drive, Dept. TJ, Detroit 12, Mich. Write today for illustrated circular.

INFORM-A-GRAM KEY No. 62-C



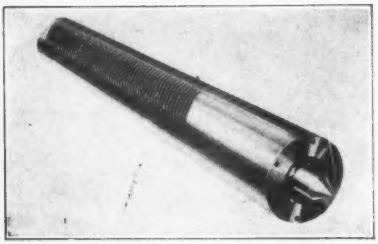
NEW ELECTRIC MARKER. The Ideal Commutator Dresser Co. has announced a new electric marker for putting names, sizes, numbers, etc., on objects made of iron, steel, bronze, aluminum, ceramics, tile, marble, lead, plastics, porcelain, glass, etc. The Ideal Marker is 6" long, 1½" wide, weighs only 10 ounces and since it is shaped to fit the hand, can be held and used to write almost as easily as a pencil. An entirely new principle in design has increased the power of the cutting stroke 30% over previous models. It operates from any ac electrical outlet. This marker works like a small electric hammer, making 7200 cutting strokes per minute; and cuts right into the surface leaving lines that cannot be wiped away or worn off with ordinary usage. For average marking, a hardened alloy point is furnished as standard. A diamond point is recommended if extra hard materials—54 to 64 Rockwell hardness Scale C—are to be marked. Illustrated literature will be sent by IDEAL COMMUTATOR DRESSER CO., 5186 Park Ave., Sycamore, Ill.

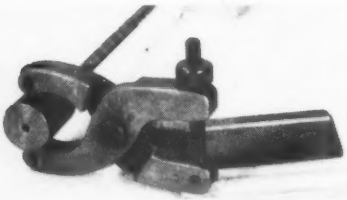
INFORM-A-GRAM KEY No. 329-C

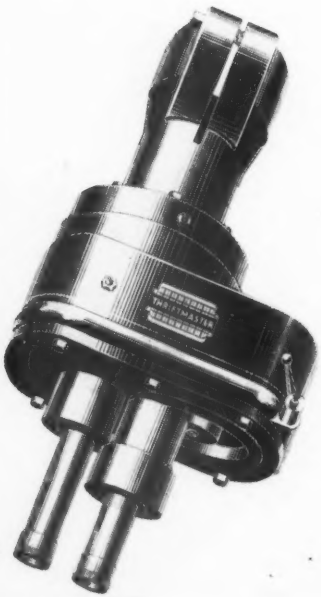


MICCROTUBE is a new product of the Michigan Chrome & Chemical Co. for the insulation of plating racks. It is an extruded tubing made from a tough, elastic plastic base material that has exceptional resistance to plating baths and cleaning solutions. Miccrotube is available with inside diameters ranging from ⅛" to 1". It will withstand, without damage or deterioration, hot plating solutions including 180-190° copper, and practically all types of boiling and cleaning solutions. It is

PROGRESS ON PARADE







not, however, recommended for use in trichlorethylene. Even under the most adverse conditions Miccrotube remains tough and flexible and will not harden or crack. Its smooth and glossy surface permits solutions to drain from the racks more quickly and thoroughly. The contact wires of the rack are covered with Miccrotube and the spline is wrapped with Miccrotape, another product of Michigan Chrome & Chemical Co. The two materials can then be fused by heating into a continuous, homogeneous coating and thus provide a solid protective coating of any desired thickness without repetitious dipping and drying. On certain types of racks it is possible to insulate the whole rack with Miccrotube. To obtain additional data, write MICHIGAN CHROME & CHEMICAL CO., Dept. T, 6350 E. Jefferson Ave., Detroit 7, Mich.

INFORM-A-GRAM KEY No. 997-C

A NEW LIVE CENTER TAILSTOCK SPINDLE manufactured by the POPE MACHINERY CORPORATION, Dept. TDJ, Haverhill, Mass., provides automatic compensation for heat expansion of lathe work without displacement of the center from its true axial position under load. The live center should be mounted on anti-friction bearings so preloaded that the weight of the work or the stress of the cutting tool will not cause the center to be moved, however slightly, from the true axial rotation. The spindle is mounted on oversize precision bearings, properly preloaded and having abundant capacity to carry the radial loads. The end thrust is taken on a separate set of preloaded thrust bearings mounted to allow for work expansion without building up excessive pressure on the bearings. Setting up the work and adjusting the center is all that is required of the operator. No further adjustment is necessary. The illustration shows a Pope live center tailstock for a production engine lathe which is 53" long, 6½" in diameter and is capable of supporting work pieces weighing 10 tons or more. The manufacturer will send complete information on request.

INFORM-A-GRAM KEY No. 741-C

KNURLING TOOL. Since the knurling tool manufactured by Joseph B. Fakes & Co. can be set at any of a large range of sizes and left until the job is completed, it meets the demand for a method of producing identical duplicate knurled parts and eliminates many of the problems arising from the present method of knurling. Long pieces of small diameter can easily be knurled with this tool, making it particularly efficient in the manufacture of gages, tools and parts where small centers shorten lapping operations. The Fakes Knurling Tool saves the lathe since it compounds itself where formerly the lathe carried this pressure. It eliminates pressure on the cross feed screw and undue side pressure on the part knurled. Pressure required for knurling is produced by a direct pull knurl

1ST QUARTER 1944

2ND QUARTER 1944

3RD QUARTER 1944

4TH QUARTER 1944

1ST QUARTER 1945

ORDERS FOR DETROIT STANDARD THREAD MILLING CUTTERS

They're Specifying Detroit Standards

Look at that quarter by quarter record of orders for DETROIT STANDARD thread milling cutters—yes, and DETROIT makes specials, too.

Those DETROIT standards—amplified by new types and sizes as needed—are becoming the accepted standards of Industry.

Many companies now simply order their thread milling cutters by DETROIT STANDARD Blank number and desired thread form. Eliminates Tool Engineering, saves delivery time.

Detroit Thread Milling Cutters, standard and special, are making unnecessary the slower more costly method of grinding on scores of precision threaded parts.

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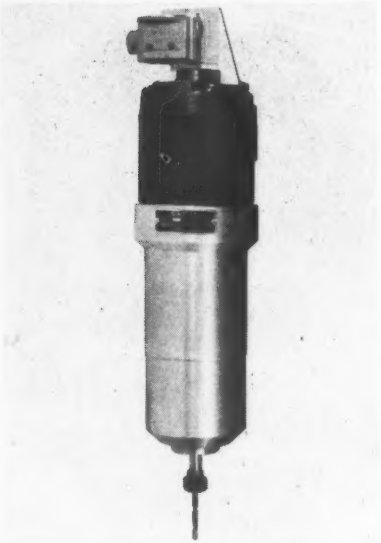
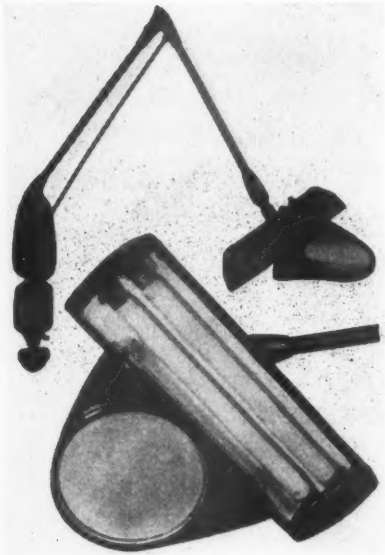
• TAPS—THREAD GAGES • CUTTER HOOK AND SPACING CHECKER •



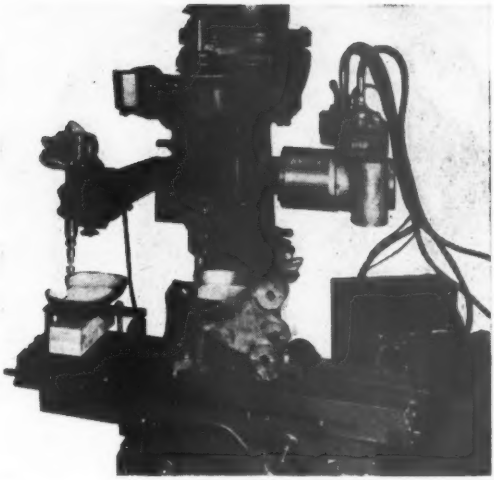


against knurl. This tool also makes knurling on a bench lathe or other small lathes an easy operation. The Fakes will handle any standard knurls 3/8" x 3/4". You can obtain literature by writing JOSEPH B. FAKES & CO., 1415 Etowah Ave., Dept. TJ, Royal Oak, Mich.
INFORM-A-GRAM KEY No. E70-C

OFFSET-TYPE ADJUSTABLE DRILLHEAD. The development of a new two-spindle offset-type drillhead—illustrated on page 154, bottom left—in which one spindle is built integral with the drive shaft and the other is offset and adjustable for variable centers has augmented drillhead production of Thomson Industries, it was announced recently. This new drillhead permits drilling on closer centers than possible with the conventional type in which both spindles are adjustable. The three most popular sizes have spindles provided with 1/4" capacity chucks, No. 1 or No. 2 Morse taper and are available from standard designs. This drillhead is of full ball bearing construction—all vital parts are completely enclosed—running in grease. The manufacturer, Thriftmaster Products Div. of THOMSON INDUSTRIES, INC., 29-05 Review Ave., Dept. TDJ, Long Island City, N. Y., will send details on request.
INFORM-A-GRAM KEY No. C45-C

NEW AUTOMATIC DRILL UNIT. A new unit for the automatic drilling of holes ranging from No. 50 to 1/4" diameter has been developed by the SIMPLEX TOOL ENGINEERING CO., Dept. T-8, 132 Duffield St., Detroit 1, Mich. It can be mounted at any angle or plane and is especially adaptable for the simultaneous drilling of several holes in a single part in one operation. All units can be controlled from a single push button within easy reach of the operator. They are self-contained and the forward and reverse movement of the drill spindle is completely automatic. For your copy of an illustrated folder describing the Automatic Drilling Unit, write Simplex Tool Engineering Co.
INFORM-A-GRAM KEY No. B63-C

MAGNIFICATION WITH FLUORESCENT LIGHTING. A new magnification feature known as "Super Sight" has now been incorporated in fluorescent lighting units manufactured by the Safety Division of THE BOYER-CAMPBELL CO., 6540 St. Antoine St., Dept. TD-8, Detroit 2, Mich. The magnifying lens and light assembly are mounted on a bracket that can be instantly placed in any position over a wide work area. Fluorescent lighting adds substantially to the comfort of the operator on jobs where "Super Sight" is used continuously, such as in engineering—reading the slide rule, making detailed layouts, checking prints, etc.; in the shop—for work over a surface plate; checking verniers and micrometers; checking hardness cracks, etc. With this new adaptation of "Super Sight" it can now



INSTALLATION:

DOUBLE DUPLIMATIC

Applied to Reed-Prentice Vertical Milling Machine

WHY?

To machine dies.

HOW?

DUPLIMATIC is rolled to any convenient position beside the mill. DUPLIMATIC hydraulic motors are mounted on the mill. One on the head feed and one on the table feed. DUPLIMATIC tracer is mounted off the left side of the head. Soft model is placed on the table.

RESULTS:

The exact shape and size of model is reproduced onto the die thru genius of DUPLIMATIC tracer control and our exclusive electro-hydraulic control circuit.

CUSTOMER REACTION:

"because of the great accuracy of Duplicating, a 3% increase in the efficiency of the (product) is expected."

QUESTION:

Does installation of DUPLIMATIC require the removal of any essential part of the milling machine?

ANSWER:

No. The Milling Machine can be operated in the conventional manner just as though the DUPLIMATIC were not attached.

QUESTION:

Can this same DUPLIMATIC be applied to any other milling machine in my shop or to any lathe, boring mill, shaper or planer?

ANSWER:

Yes. All that is required is for you to make a bracket to mount the motor and the tracer.

QUESTION:

What statement can you make concerning speed, accuracy and surface finish?

ANSWER:

DUPLIMATIC Controls are superior in all three departments to anything else manufactured for the purpose of machining curved surfaces or edges.

QUESTIONS: Send any questions you might have about Die Sinking, Plastics Mold Making, Contour or Profile Turning, Milling, Boring, or Shaping

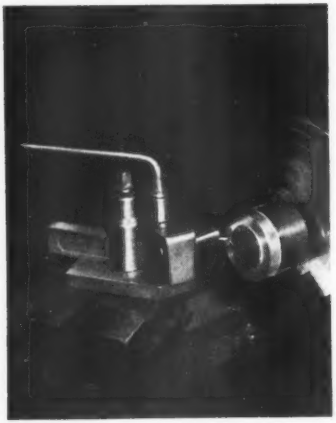
DETROIT UNIVERSAL DUPLICATOR CO.

724 EAST MILWAUKEE AVENUE · DETROIT 2, MICHIGAN

be supplied in three types of lighting—standard bayonet type of bulb; lamps sealed to relieve the explosion hazard; and fluorescent lamps. It is also available in three types of brackets and two sizes of lenses, permitting application to most any industrial need. Write The Boyer-Campbell Co. for further information.

INFORM-A-GRAM KEY No. 67-C

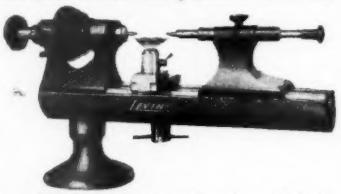
UNIVERSAL TOOLHOLDER. The Lane-Wells Type "L" Universal Toolholder was designed to speed engine lathe production operations when a series of identical cuts are to be made. It consists of a body, which fits into the lathe tool post in the conventional manner, and detachable heads which hold standard high speed or carbide tipped tool bits. When the body is once fastened in the tool post and the bits adjusted in the heads, it



requires less than three seconds to change from one tool to another. These attachments are made in four sizes to fit any engine lathe from 9" to 36" swing. Eleven different standard heads are available for boring, turning, facing, forming, drilling, reaming, tapping, etc. Special operation heads can be made from the standard blanks. Full details are available from LANE-WELLS CO., 5657 South Soto St., Los Angeles 11, Calif.

INFORM-A-GRAM KEY No. 356-C

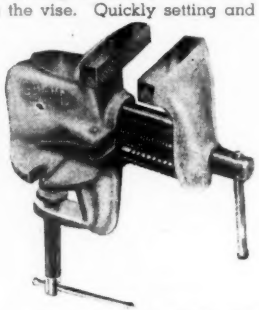
PRECISION BENCH LATHE. To meet the demand for a tool that is rugged, yet sensitive enough for the most delicate work, Louis Levin & Son of Los Angeles have designed a precision bench lathe for use by instrument makers, model makers, tool makers or production departments where small or delicate work is handled. It has a hard steel spindle and bearings of the double cone type; the swing is 3.94" and the length of the bed is 12". The bed is ground to a master gage and is provided with a binding bolt which requires no shoes for attachments. The tip-over hand rest, which is used for hand turning, is made with a well fitting joint to eliminate all



play. The head stock pulley has 60 holes in it and can be used for indexing operations. Available also are such accessories as a compound slide rest, milling attachment and traverse grinding attachment. A descriptive bulletin on the Levin lathe and accessories will be sent on request by LOUIS LEVIN & SON, INC., 2206 Beverly Blvd., Dept. TJ-8, Los Angeles 4, Calif.

INFORM-A-GRAM KEY No. E73-C

"QUICK-ACTION" MACHINIST'S VISE. The new Grand 3" Quikcet Alloy-Steel Machinist's Vise, manufactured by Grand Specialties Co. of Chicago, is manually operated but does not require running the screw in or out to close or open the vise. Quickly setting and closing



the vise can be done by simply pushing on the body of the free jaw which slides in swiftly on a ratchet screw and two precision guide rods and tightens with a turn of the handle. A trigger release pawl with ¾" of thread holds the hardened screw under spring tension. The vise will open instantly to the full 3" by pressure of thumb or finger on trigger release after tension has been eased by a single turn of the loose-proof handle. The Quikcet Vise is made of alloy steel with reinforced, extra thick wall, body construction and

Save DRILLING *Time* WITH SUBLAND OIL-HOLE DRILLS!

A COOL CUTTING EDGE MEANS FASTER DRILLING

You can perform 2-step drilling with Subland Oil-Hole Drills much faster than with ordinary subland drills for the simple reason that there is never any danger of the drill overheating.

A constant stream of oil, delivered under pressure to each of the cutting edges, assures a cool drill at all times. The pressure of the oil also serves to force the chips out through the flutes, preventing them from accumulating at the cutting edges—the common cause of scoring.

Because of its cooling feature, an Oil-Hole Subland Drill remains sharp much longer, having a life two to three times that of ordinary drills. Remember this the next time you need drills for 2-step drilling!

Made to Specifications!

All sizes from ½″ to 3½″ in diameter and up to 36″ overall. Please specify taper or straight shank. We also specialize in the manufacture of all types of subland drills and reamers.

Morse Taper Shank

Straight Shank

Detroit Reamer & Tool Co.

2830 E. 7-Mile Road Detroit 12, Michigan

Manufacturers of Oil-Hole Drills, Special Reamers, Circularity Relieved Reamers, End Mills and Special Tools.

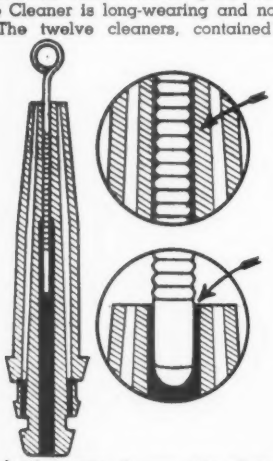
Write for QUOTATION

PROGRESS ON PARADE

extra heavy precision guide rods; and has a balanced precision grip at all points, with polished, serrated and hardened jaws which are integral with the body, eliminating jaw plates which may come loose or have to be replaced. Copper plating on all working parts and handle makes it spatterproof for welding and the gray wrinkle enamel finish makes it rust proof. The vise is also equipped with polished anvil on top and with bottom screw clamp for quick shifting to any job, as well as with the usual slots for bolting to bench for stationary use. GRAND SPECIALTIES CO., Grand Ave. at Troy, Dept. TDJ, Chicago 22, Ill., will send additional details.

INFORM-A-GRAM KEY No. E58-C

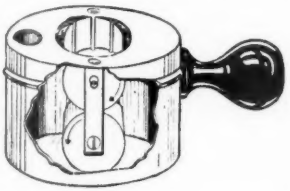
ACETYLENE TORCH TIP CLEANER. The new Wypco Tip Cleaner with its smooth round pilot and evenly rounded-shoulder stainless steel construction, cleans and polishes the inside of the tip without damaging it. This cleaner provides a better job of acetylene burning; lower labor, maintenance and tip replacement cost with increased production. The Wypco Cleaner is long-wearing and non-rusting. The twelve cleaners, contained in a



brown leather case, fit any size of pre-heat, high pressure, oxygen and acetylene holes in the drill sizes of No. 75 to 49 inclusive. The case holds the cleaners together protecting them against loss and making them easy to carry in the workman's pocket. Individual large sizes are made to fit the larger burning tips. Wypco Tip Cleaners are manufactured by MAITLEN & BENSON, Dept. TJ, 1312 Rose Ave., Long Beach 4, Calif., who will send prices and additional data on request.

INFORM-A-GRAM KEY No. E71-C

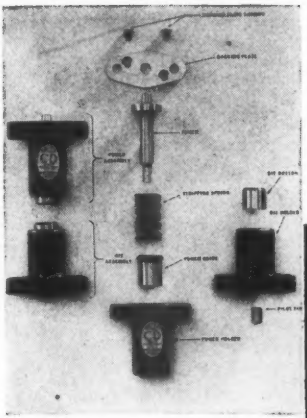
A NEW MARKING POT, constructed with two rotating wooden rollers conveying the liquid marking ink from the bottom of the closed metal container to the top roller and then to the stencil brush, has recently been announced by ADOLPH GOTTSCHO, INC., 190C Duane St., New York 13, N. Y. No ink is lost with this "Ink Fast" marking pot since the lower roller reaches almost to the bottom of the pot and easily brings the last amount of ink up to the stencil brush. Since the two rollers automatically stir the ink to prevent



settling, there is no pigment accumulation on the bottom and no thickening of the residue of ink left in the pot. The "Ink Fast" is 3¾" in diameter, 2⅝" high, light in weight and has a comfortable handle for holding; ink capacity is 12 ounces. The cover, which has the two-roller assembly attached to it, is easily removable for filling and cleaning and has an additional hole for marking brush use. Adolph Gottscho, Inc., will send literature and the name of your nearest "Ink Fast" distributor on request.

INFORM-A-GRAM KEY No. 44-C

A NEW TOGGLE-ACTION CLAMP, Model KV-221, to fill requirements for extraordinary pressure in clamping at an angle to the base mounting, has been designed and recently placed on the market by KNU-VISE, INC., Dept. J, 1330 Plum St., Detroit 16, Mich. As it is slightly larger and sturdier than the



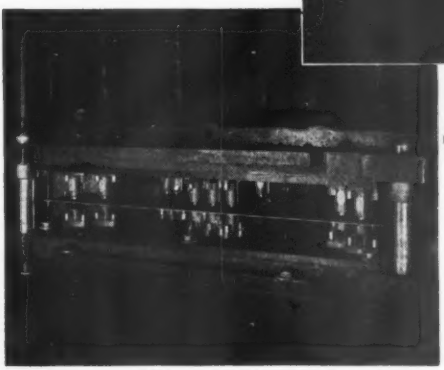
Showing all parts of Wales Type "CD" Units assembled and disassembled. These parts are easily assembled and disassembled for quick changes.

SIMPLIFY... STANDARDIZE... SAVE WITH...

WALES

TYPE "CD"

HOLE PUNCHING UNITS



Illustrating the work being punched with stamping press ram in down position.

Showing the work in a press brake set-up. Note unobstructed feeding of the work.

● The customary expensive and time-consuming methods usually associated with building a single purpose die to punch a multiplicity of holes *is eliminated* with Wales Type "CD" Hole Punching Units.

SAVE making special punches and punch plates, special stripper plates and special die buttons and die plates.

SIMPLIFY die design and die making.

STANDARDIZED Wales punches, dies, and stripping mechanisms permit units and parts to be carried in stock for setting up and servicing.

Write TODAY for functionally colored, 32-page catalog with 48 illustrations showing these Units being set up and operating in stamping presses and press brakes.

WALES-STRIPPIT CORPORATION

ARMY NAVY

355 Payne Avenue
North Tonawanda, New York

(Between Buffalo and Niagara Falls)

GEORGE F. WALES, President

Specialists in Punching and Notching Equipment

company's Model KV-220 clamp this new Model KV-221 clamp can be used to advantage inside of jigs where operating space may be limited. It can also be used as a locating device in progressive drilling fixtures. The KV-221 weighs 23 ounces and measures 7⅛" in height and 6⅛" in length. Its recommended load at the end of the standard toggle bar is 240 lbs. The company will supply ful sized templates upon request.

INFORM-A-GRAM KEY No. 649-C

FLAT BROACH SHARPENER and BACK-OFF MACHINE. Designed and manufactured by the Great Lakes Broach & Gage Co., this new machine will efficiently and rapidly handle practically all flat broaches, inserts, keyways, and broach bar assemblies. A particular feature is the handle for the table

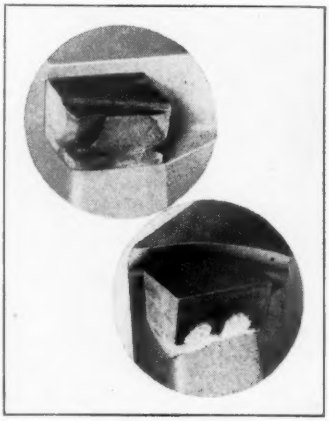
feed, graduated to .0005", thus enabling the operator to re-step and back-off keyways and other similar broaches without employing a surface grinder.

Further information may be had direct from GREAT LAKES BROACH & GAGE CO., Dept. T-5, 1008 Franklin St., Detroit 8, Mich., or by use of

INFORM-A-GRAM KEY No. 611-C

A NEW METHOD OF BRAZING CEMENTED CARBIDE TIPS to tool shanks has been developed by NEWCOMER PRODUCTS, 154 Gerard Street, Latrobe, Pa. This process prevents the cracking of the carbide tip, and at the same time permits heavier cuts and gives longer tool life. This new method, developed after considerable research by William Newcomer, a pioneer in the carbide field, can be satisfactorily applied regardless of the make or grade of carbide.

The upper half of the accompanying illustration shows a cracked carbide tip in a finishing tool for 8" M-106 shell, magnified to emphasize defect, which occurred on first run.



The lower half of illustration shows a properly brazed Newcomer tool which, according to experience, permits 3 to 10 regrinds depending upon treatment.

Further information may be obtained on request to the company, attention Dept. TJ, or by use of

INFORM-A-GRAM KEY No. E85-C

MACHINE SHOP METHODS. Standard and Emergency, by Fred H. Colvin, Editor Emeritus of American Machinist and Frank A. Stanley, Consulting Engineer and Editor. This practical manual of machine shop methods begins with an outline of various machine shop operations as well as the customary machines on which they are performed. This may help to prevent the perpetration of machinery designs that are difficult or impossible to machine by ordinary methods. Following the standard, usually preferable methods of machining, the authors show how many of these operations can be performed by entirely different methods, which have been used in actual production and in some cases have proved to be most efficient. It shows, for example, how turning is done on a drill press, a boring machine and a milling machine instead of on the lathe; methods of improvising machinery and fixtures; and contrivances for handling unusual and difficult jobs. These standard and emergency shop methods herein explained should prove especially helpful to mechanics in shops having limited equipment. Published by McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 18, N. Y. Priced at $3.50.

How Many Hours Would You Need to Mill this Master Hob?

Speed, economy and accuracy are typical performance features of a Milwaukee Rotary Head Milling Machine. The milling operation on this master hob is an excellent example. *Read this job report —*

MASTER HOB — MATERIAL — High Carbon—High Chrome Steel. TIME DISTRIBUTION—Set-up, ¾; Layout, 1¼; Rough Mill Complete, 10; Finish Mill Complete, 29. A total time of 41 hours.

Check these advantages of the Milwaukee Rotary Head Milling Machine and how you can benefit from them in your own shop:

DIRECT . . . mills mold cavities in a single set-up without the aid of templets or models.

ACCURATE . . . chances for error are eliminated because there is no change in set-up. Exact control of all combinations of cutting movements — possible only with this machine — transmits mathematical precision to the work.

FAST . . . initial job preparation and set-up time is reduced to the minimum. Accurate performance of the machine saves operator's time and rapid production of intricate molds and dies is the result.

Write for Bulletin No. 1002C and complete information.

BUILDERS OF MILWAUKEE ROTARY HEAD MILLING MACHINE • FACE MILL GRINDER • AUTOMETRIC JIG BORER • SPEEDMILL • MIDGETMILL • CENTER SCOPE.

KEARNEY & TRECKER

Products

CORPORATION

Milwaukee 14, Wisconsin

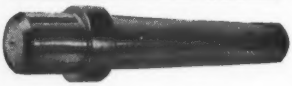
Subsidiary of Kearney & Trecker Corporation

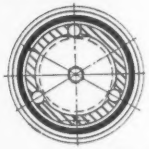
ENGINEERS AND PRODUCTION MEN LOOK!

Concentricity In Low 10,000ths Is Yours

NOW—EXPANDED FACILITIES PERMIT
15 DAY SHIPMENT OF URGENT ORDERS

Curtiss-Wright Corporation
ranks our product with
THEIR BEST TOOLS





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1. **Uniform full-work-length friction-locking gives complete control and contact of entire bore surface area**
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6. **Any machine operation**
7. **For bore diameters .718 to 5.5**

Moderate first cost. For quotations send detailed sketches showing part in position.

Meehanite in South Africa

Engineer and Foundryman, published in Johannesburg, South Africa, reports: "Umgeni Iron Works (Pty.), Ltd., are casting in Meehanite, Diesel engine cylinder heads for buses and trucks. The patterns and cores were produced in their own works and a very satisfactory product has resulted. One noteworthy outcome of the use of Meehanite is the claim by drivers that the performance of vehicles reconditioned with these cylinder heads has been improved.

"A recent meeting of the Natal Section of Institute of British Foundrymen discussed possible reasons for this reported improvement. Various reasons were adduced, and the consensus of opinion appeared to favour the suggestions that heat transference was effected more rapidly and the close grain of the cylinder head reduced the local 'hot spots' which tend to cause pinking."

Meehanite is used extensively in this country in the castings of large Diesel units including crankshafts, crankcases, cylinders, and cylinder liner heads, and in the small Diesel engine field. The experience of the drivers in South Africa should prove of interest to builders here.

INDUSTRIAL DIGEST

SCIENCE • RESEARCH • METHODS • TOOLING
PRODUCTION • TRADE NEWS AND REPORTS

Airtight Steel-to-Glass Seal for Metal Tubes Developed by RCA

A new method of fusing steel and glass in a permanent airtight seal for metal electron tubes has been announced by Dr. G. R. Shaw, Chief Engineer of the Tube Division of the Radio Corporation of America. The method provides a more foolproof process, in addition to permitting the use of a staple metal for the glass-to-metal seal in place of special alloys which are more costly and sometimes scarce.

The new procedure, developed by engineers of RCA's tube manufacturing plant at Harrison, N. J., depends upon the control of processing so as to secure good "wetting" of steel by glass. At the same time, the new procedure incorporates a mechanical design which provides compression strains at the glass-metal boundary, and thus compensates for differences in expansion of the two materials.

Since the ruggedness and self-shielding character of the metal tubes makes them especially desirable for use in combat equipment of the armed forces, the steel-to-glass seal is of direct significance to the war program as well as to future peacetime applications.

The surfaces sealed by the new method are the outer edge of a flat, round, glass button and the inside of a metal band known as the header insert. The glass button serves to insulate the wire leads which connect internal elements of the tube with the pins on the base by means of which it is "plugged in". The header insert is used to join the button to the header, a ring of steel which, with the button, forms the "floor" of the tube, and is welded to the open end of the metal envelope to support the internal structure and complete the enclosure.

The principle which now permits the use of steel for the header insert involves the fact that glass is a solvent for oxides. By applying intense heat from fine jets of gas flame to the outside of the oxidized steel band, it is possible to cause any excess oxides to dissolve into the glass. Before this principle was applied, too much oxidation was as serious an obstacle as too little, the latter preventing adhesion, while the former left a porous interface between the metal and the glass.

G. E. Scholarship Fund

A fund of $400,000 has been set aside by the directors of the General Electric Company to be known as the Gerard Swope Foundation. This fund is to assist in higher education and fundamental research work in scientific and industrial fields.

The directors announced that the new foundation was created "as an expression of appreciation of Mr. Swope's great contribution as the leader and inspiration of the General Electric Company for so many years, and as a means of making this appreciation of enduring and constructive benefit to the company and to the electrical industry".

Mr. Swope served as president of G. E. for more than 19 years, from 1922 to the close of 1939, and for an additional two years in 1942-1944 he returned to head the company when C. E. Wilson, now president, was acting as executive vice chairman of the War Production Board.

It is proposed to utilize the income of the foundation in the following ways:

In granting loans or scholarships to

employees and to the children of present or former employees of the company and its affiliated companies, to help them pursue their work in any field of study and in any approved university, college, or technical school in the United States;

In granting graduate fellowships to the same classifications of individuals to be used by the recipient for graduate work in industrial management, engineering, the physical sciences, and in any other scientific or industrial field;

In granting loans, scholarships, or fellowships in any of the above fields to any other person that may be deemed worthy of assistance;

And finally, in granting graduate fellowships, to make contributions to the university, college, or technical school to help in defraying the cost of equipment and material, especially needed in connection with a research project.

Applicants for loans, scholarships, and fellowships will be considered not only from the standpoint of academic attainment and financial needs, but also as to character and personal qualifications for deriving the greatest good from the continuation of their studies. The grants will be made without regard to sex, color, creed or national origin.

Industrial Electronics Training Course

A new Industrial Electronics training course, which offers a thoroughly practical and quickly grasped understanding of the subject of industrial electronics, has been announced by the General Electric Company. The new course, organized for presentation in twelve sessions, is expected to have wide use throughout industry wherever electronic equipment is applied or a knowledge of it is required.

In industrial plants, the course should provide electrical personnel with sufficient theory and application information to acquaint them with electronics in general; production and process engineers engaged in reducing production costs should find that it offers innumerable practical suggestions; designing engineers involved with improving products should obtain much stimulation and a variety of new ideas; and production managers and plant superintendents should discover methods for cracking open production bottlenecks.

Presented throughout in a clear, nontechnical manner, the course consists of twelve talking slide films (35 mm film strips and 16", 33 1/3 rpm records) each approximately thirty minutes in length; twenty-five copies each of twelve lecture review booklets keyed to the slidefilms; and instructor's manual covering the presentation of all twelve lectures; and an attractive, sturdily constructed carrying case designed to accommodate the complete course.

Less Opposition to Wage Incentives

Labor's traditional opposition to wage incentives is waning, according to A. C. Croft, President of National Foremen's Institute.

Mr. Croft asserted that an employer who prefers piece-work will find it generally true that his employees have the same preference; conversely, where an employer prefers time-work, his employees likewise usually do. He admitted that some of the popularity of wage incentives during the war has risen out of its value as a device for giving workers increased earnings without contravening the Little Steel formula, but much of the popularity is a genuine conviction among labor leaders that, providing certain standards are met, wage incentives increase workers' earnings, reduce grievances, and make for a more satisfied union membership.

Mr. Croft listed reasons for the growing preference among unions for piecework as against time-work as follows:

1. The bargaining advantage it gives employees. When they increase their productivity, they do not have to bargain with their employer in order to get a wage increase. They get the increase automatically.

2. It enables unions to obtain higher earnings for their members without appreciably raising labor costs. Most progressive unions realize the jobs of their members depend on the ability of the

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IF the job you do gives your eyes a hard workout Magni-Focuser is made for *you!* This *binocular* eye loop enables you to see an object *sharply magnified* with the comfort and clarity of normal vision. It increases accuracy — relieves eye-strain — reduces the chance of accidents. The shade shuts out all overhead and side distractions. Normal vision can be resumed at any time by just lifting the head slightly. *Allows free use of both hands.* Available in four different powers of magnification.

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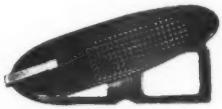
Binocular Eye Loop



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unionized plants to meet competition and stay in business. Wage incentives preserve or enhance this ability and at the same time give workers an opportunity to take home more pay.

3. Its superiority in the operation of industry-wide agreements. National agreements covering their industry or trade have always been a major goal of unions. Most such proposals have foundered on the difficulty of establishing equitable cost differentials among competing plants. Since the efficiency of labor and equipment vary from plant to plant, uniform hourly rates do not meet the need. Uniform piece rates do provide uniform direct labor costs and make industry-wide agreements possible.

"In addition," Mr. Croft stated, "the rank and file see other benefits. Small improvements are always being made in production technique, most of them too minute to require revision of the job standards. As a result, workers can look forward to a steady increase in their incentive earnings over the course of time. Then, it protects older, less productive workers. Since they are paid only for what they produce, employers do not feel obligated to replace them with younger men.

"Finally, each worker acquires the feeling that in a way he is his own boss. This feeling gives him a sense of freedom and well-being which not only conduces to more production but to better labor relations. It is buttressed by the fact that foremen under a piece-work system do not have to supervise each employee as closely as they have to under a time-work system."

Mr. Croft cited a War Production Board report which showed that during the first 90 days of operation alone, wage incentive plans adopted during 1944 increased production per man-hour an average of approximately 40 percent. In a few plants productivity increased more than 100 percent.

New FREE CATALOGS

Gage Company Precision Plastic Comparator Charts
...will enable you to cut inspection costs, improve quality and production. They provide MASTER master gage results on every optical comparator and projector. Many standard stock charts for every need ...radii, thread forms, measuring layouts, protractor devices, etc. Special charts constructed to order. Moderate in cost, precise in performance!
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SAVE TIME and CUT COSTS!

CERROMATRIX (Melting Temp. 250° F.) For securing punch and die parts, anchoring machine parts without expensive drive fits, short run forming dies and other metal-working applications.

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CERROSAFE (Melting Temp. 190° F.) Used to accurately proof-cast cavities such as molds, gun chambers, forging dies, etc., and for many similar applications.

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INDUSTRIAL DIGEST

Company Recognition for Re-employment of Veterans

A new type of recognition for private industry, a flag awarded for outstanding record of employment and training of veterans of World War II, was bestowed for the first time on Bell & Howell Company, pioneer Chicago manufacturer of optical and motion picture equipment. The award, first in a proposed nation-wide series, was made jointly by the National Association of Personnel Directors and the national organization of Disabled American Veterans. The ceremony was witnessed by 113 returned veterans who are already at work in the five Chicago plants of Bell & Howell and approximately 1,400 workers in the company's Lincolnwood plant. J. H. McNabb, president, accepted the award for his company.

Dr. F. C. Jeths, Illinois commander of Disabled American Veterans, told company workers and officials about the national program to encourage employment of veterans which his organization has undertaken in conjunction with the association of personnel directors. The program entails operation of placement offices for veterans in principal cities, patterned after the office which has been operating in Chicago since July 1, and the recognition of firms or industries by awards similar to the one first made to Bell & Howell.

Mr. McNabb, president of Bell & Howell, in his acceptance remarks, said that slightly more than 600 of his company's employees are still in the armed services. He said that the program for rehiring former employees, as well as selecting and training veterans not previously employed, was a major project of the company. He pledged continuation of the program, with especial emphasis on placement of veterans with regard to their aptitudes, skills and interests. He commended the joint activity of the National Association of Personnel Directors and the Disabled American

THE TEST OF TIME

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Production for the armed forces in the last few years has required extreme thoroughness of inspection, and the demand for the utmost precision in manufacture will continue in the coming peace-time era. During their war-time use, Master Gauges have proved their exceptional durability and precision. Leaders in the industrial field recognize them as reliable controls that contribute to the high standard of their products . . . And now, as a factor that adds to their excellence, Master Gauge is manufacturing gauges of the longer-wearing TANTUNG . . . The metal which, tested under the most rugged conditions, has proved beyond a doubt that it has up to twice and even more wear resistance than other non-ferrous alloys — and at no higher cost.

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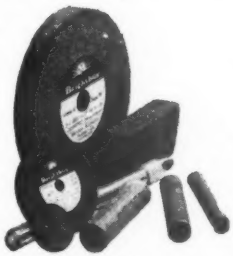
Brightboy GIVES YOU

Rubber Cushioning

A Revelation in Metal Finishing

Eventual production change-over from war goods manufacture presents new work-saving opportunities through rubber-cushioned Brightboy. Brightboy's rubber rubs and cleans. With the abrasive it gives all-in-one burring and finishing, plus a polish that often serves as the finish.

With new manufacturing opportunities on the horizon, ask your distributor *now* for Brightboy catalogs, prices and work data. And contact Brightboy service representatives on your production planning.



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Tougher texture, for finishing hard metals. The tougher binder accents the abrasive action yet retains the soft rubber cushion, finishing and pre-polishing in one operation.

BRIGHTBOY FINE-TEX
Smoother, finer texture for work on softer metals, producing special finishes and for applications where the coarser wheel might not be suitable.

BRIGHTBOY STANDARD
A favorite for burring, finishing and polishing on the widest variety of metals and metal parts.

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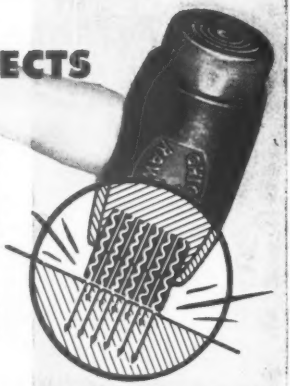
BY "molecular absorption"

Rawhide PROTECTS

By momentarily storing the force of a blow and "slowing the punch," the coiled and compressed rawhide in C/R Hammers and Mallets (1st) takes the shattering crash out of powerful blows . . . prevents breaking, disfiguring or marring of products, machines and fine finishes. (2nd) eliminates recoil—ends the fatiguing bounce common to most mallets.

With a C/R Hammer you can use a lighter tool, still strike harder and more effectively; can accomplish more with less fatigue; because striking force is mono-directional with more carry through.

WRITE FOR CATALOG SHEETS



Molecular absorption (the storing of force conveyed through the tough interwoven, resilient hide fibres) converts velocity into effective thrust.

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Veterans, predicting hearty approval and cooperation by American industry.

Mr. McNabb, who is a director of Industry for Veterans, a non-profit organization the purpose of which is to pledge support of private industry for re-employment of servicemen, has been one of the early leaders in formulating practical programs for the rehabilitation of returned veterans.

New uses for a testing gage the size of a postage stamp which is solving engineering problems heretofore considered impossible will be the basis for a conference of research engineers at the Waldorf-Astoria Hotel in New York City on Sept. 27 and 28. The Baldwin Locomotive Works' Southwark Division, manufacturers of the gage known as the SR4 strain gage, will sponsor the conference.

Strain Gage and Testing Equipment Conference

Since introduction about four years ago the gage has been used for determining stresses and strains in hundreds of different applications and it is to determine further uses, as well as to demonstrate its present applications, that the conference has been called. Other testing equipment in Baldwin's Southwark line also will be on display and will be described and demonstrated by the company's representatives.

Industrial Statistics and Quality Control will be the subject of a 10-day course given at N. C. State College, Raleigh, N. C., October 10-16 inclusive.

Industrial Statistics and Quality Control Study Course

A wide range of industries throughout the nation have expressed their interest in the instruction to be offered. Late developments and methods, under tight military censorship until recently, will be included in the State College course. The course will be expanded to include ac-

MILLING - DRILLING - BORING
ATTACHMENT for Heavy Duty Operations

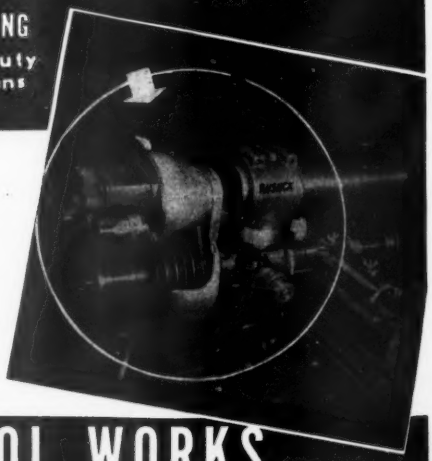

Photo shows a special operation not suited to standard straddle mill set up but easily handled by means of a RUSNOK Milling attachment used horizontally on a standard milling machine, saving one machining operation and accomplishing greater accuracy in finished piece parts. Uses many types of cutters on a wide range of work. Easily mounted—tilts to any angle. Large size spindle (No. 9 B & S taper). Takes ⅛" to ¾" end mills. Large quill with 4" travel, counter balanced, hardened and ground. Six speeds 250 to 3000 RPM. Lever and worm feeds. ½ h.p. motor. Specially engineered by RUSNOK to meet modern demands for high speed, high precision, heavy duty end mill operations. Prompt delivery.

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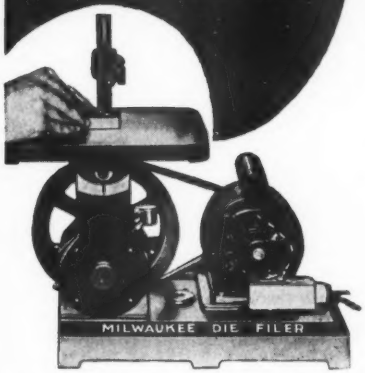

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- Low First Cost
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$118.50 without Saw Overarm. For machines without motor, deduct $8.50 from these prices.

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ceptance inspection and sequential sampling.

Since Federal funds are no longer available for these courses there will be a fee of $50.00. For further details write Director Edward W. Ruggles, North Carolina State College, Raleigh, North Carolina.

Smaller War Plants Corporation

The smaller War Plants Corporation will continue to make loans to small plants for civilian production, and the agency's 114 field offices throughout the country have been so notified by Maury Maverick, Chairman and General Manager.

The end of hostilities did not nullify the act of Congress (Public Law 603) that gave SWPC power to afford financial assistance to small manufacturers, Mr. Maverick said, but on the contrary, the needs of small business and our responsibilities are increased.

"Congress and the President have recognized that a general war situation will continue in the period of transition from war to peace", the SWPC Chairman said. "This corporation clearly has a definite responsibility of assisting small business to maintain its competitive position, which is necessary to the economic stability of the nation.

"Therefore, we will continue to make available the services of this corporation to keep small business in operation during the transition from war to peacetime activities."

Mr. Maverick called particular attention to the services SWPC can render to small plants in connection with the termination of war contracts.

In the three years it has been in operation, SWPC has authorized financial assistance to small plants, in loans and machinery leases, totaling $333,091,505.

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Reg. U. S. Pat. Off.

SOCKET HEAD CAP SCREW

with the knurled head

No fumbling around for a wrench right away . . . no slipping, sliding fingers, no wasted motion and lost time. These screws can be started quickly, because the *knurled head* affords a firm grip and allows the screw to be screwed-in farther and faster, before using a wrench.

Sizes from #4 to 1½" in diameter; full range of lengths. Send for Catalog of "Unbrako" Socket Screw Products.

Knurling of Socket Screws originated with "Unbrako" years ago.

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PUBLICATION PREVIEWS

Keep Informed!
CATALOGS
BULLETINS
SPECIFICATIONS

PRATT & WHITNEY POSTWAR CATALOG. Just off the press, this attractive publication by the well-known New England manufacturer of machine tools, small tools and gages, combines for the first time under one cover the complete list of Pratt & Whitney products . . . Machine Tools, Keller Machines, Kellerflex and Small Tools as well as the company's Agency Sales line. It is a 72-page book of condensed information and specifica-

tions, illustrated throughout with close-up photographs of the various products. This catalog offers many helpful suggestions in connection with reconversion planning and tooling. A free copy may be had by writing on your company letterhead to PRATT & WHITNEY, Dept. T-9, West Hartford 1, Conn., or you may use our postage-free

INFORM-A-GRAM KEY No. 430-C

LUBRICATING AID which when added to the lubricant you are now using establishes a lubricating film on moving parts that prevents metal-to-metal contact is described in Bulletins 24 and 25 issued by SCIENTIFIC LUBRICANTS CO., Dept. T-4, 3469 N. Clark St., Chicago 13, Ill. This Motor Mica Anti-Friction Compound is used for metal working, stamping, drawing, turning, drilling, milling, threading, tapping, boring, die casting, screw machine and other operations. It makes bearings run cool, minimizes wear, saves power by reducing the friction load, does not cake, gum, harden or dry up and is not destroyed by heat or moisture which consume ordinary lubricants.

INFORM-A-GRAM KEY No. 456-C

TOOL & CUTTER GRINDER—The No. 3 Motor-in-Head Plain Tool and Cutter Grinder which is ideally suited to the shop with a great deal of work is featured in a descriptive 4-page bulletin available from the PRODUCTION MACHINE CO., Dept. T-5, Greenfield, Mass. With the set of attachments furnished, this grinder is capable of handling a great variety of tool sharpening or tool-room grinding, within its capacity. With it may be sharpened straight, taper or rose reamers; spur, bevel, formed cutters and taps. Additional equipment can be had to sharpen end mills, counterbores, spiral cutters and drills.

INFORM-A-GRAM KEY No. 105-C

CARBIDE TIPPED TOOLS for boring, bottoming, facing, grooving and threading are pictorially described in Catalog 398 released by the BOKUM TOOL CO., Dept. T, 14775 Wildemere Ave., Detroit 21, Mich. These tools are recommended for boring non-ferrous and the harder types of materials and steels—a task that is usually beyond the normal capacity of high speed steels of C65 to 67 Rockwell. Specifications and prices are included.

INFORM-A-GRAM KEY No. A43-C

ADJUSTABLE DRILLING HEADS—Linderme sturdily constructed Two Spindle Adjustable Drilling Heads are made in two types as illustrated in a 4-page bulletin published by the LINDERME MACHINE & TOOL CO., INC., Dept. TJ, 12250 Coyle Ave., Detroit 27, Mich. Each type is available in a variety of sizes, suitable for use with large or small drill presses. "A" and "B" Models are made with a "sleeve" adaptor, for fitting to individual drill press quills, according to specified requirements. "C" and "D" Models are made with an "overarm" adaptor, equipped with guide pins, springs, and brackets, mounted to a 12" x 14" x ¾" cast iron base, with surfaces ground, on which drilling fixtures may be used.

INFORM-A-GRAM KEY No. A85-C

"HANDBOOK OF METAL SAWING", a new 48-page book printed in full color, has been

PUBLICATION PREVIEWS

published by W. O. BARNES CO., INC., Dept. TD, 1297 Terminal Ave., Detroit 14, Mich., manufacturers of hack saw blades and metal cutting. Several pages filled with general recommendations on the use of hand and power hack saws, together with instructions on the operation and adjustment of metal cutting band saws are included. Many tables of "Recommended Teeth and Speeds" relating to hand and power hack saws and conventional and skip tooth band saws, specification tables with saws required for the various makes of band saws, and other tables provide useful, informative data certain to improve the performance of your equipment and the results obtained from the tool. Special attention is paid to narrow width and skip tooth band saws for high speed cutting of soft non-ferrous alloys, plastics, laminates, etc.

INFORM-A-GRAM KEY No. 203-C

TEMPERATURE CONTROL by Niagara Aero Heat Exchanger is described in Bulletin 96, published by NIAGARA BLOWER CO., 6 East 45th Street, New York 17, N. Y.

The Niagara Aero Heat Exchanger provides more economy in cooling liquids or gases for year-round operation in any climate, because it is independent of mechanical refrigeration or any other cooling medium. Installations are engineered to supply controlled temperature cooling simultaneously for water and oil quenching baths, air compressors, degreasers, motor-generators and bearings. As compared to conventional water cooling methods, it saves approximately 95% of the cost of cooling water and does not require a large continuous water supply for trustworthy operation. The user saves the cost of a spray pond or cooling tower and shell and tube cooler because both these pieces of equipment are eliminated. Because heat is removed by air which is inexpensive to move, the Niagara Aero Heat Exchanger also saves the cost of large installations for handling water, including pumps, piping, tanks and other equipment. This heat exchanger uses air to cool liquids or gases by evaporative cooling. The heat from a fluid within the tubes is removed by the evaporation of moisture on the outside of the tubes. Each pound of water evaporated absorbs approximately 1000 Btu from the fluid. It is possible to cool a fluid in a closed system within 10° of the outside wet bulb temperature, independent of any secondary medium. Bulletin 96 will be mailed on request to the company, attention Dept. TJ.

INFORM-A-GRAM KEY No. 441-C

METAL CUTTING TOOLS are attractively featured in Catalog No. 44 published by the PUTNAM TOOL CO., Dept. J, 2985 Charlevoix Ave., Detroit 7, Mich. Its 92 pages pictorially describe the full line of Putnam End Mills, Chucking Reamers, Continuous Pilot Counterbores, Holders and other products. Full specifications and prices of the 1023 items now in the Putnam line are listed. Additional sections are devoted to Putnam special purpose tools and engineering data invaluable to cutting tool users. A copy will be sent to anyone requesting it on company letterhead.

INFORM-A-GRAM KEY No. 480-C

CLAMPS, TOOLS & ACCESSORIES are featured in catalog No. 108, just published by THE CINCINNATI TOOL CO., Dept. T-5, 1964 Waverly Ave., Cincinnati 12, Ohio. Each of the Hargrave standard, body and superclamps is tested to more than its rated load with a hydraulic clamp tester which applies loads of up to 30,000 lbs. All Hargrave chisels, punches, star drills, stone points, etc., are hand forged from special analysis alloy steel. Hargrave alloy steel cold chisels are each put in the drop test twice to locate flaws on either side. Each chisel must cut a chip from heat-treated spring steel which is nearly as hard as the tool being tested. Sturdy, durable materials, the most careful workmanship, and thorough testing for standard quality characterize these Hargrave products.

INFORM-A-GRAM KEY No. 047-C

RESISTANCE WELDING AT WORK is the subject of a well illustrated booklet issued by PROGRESSIVE WELDER CO., Dept. T-35, 3050 E. Outer Drive, Detroit 12, Mich. The operations and equipment described herein include: Portable Gun Welding; Stationary Spot Welding; Seam Welding; Special Uses and Machines for Welding; and Fixtures. In recent years, resistance-welding development has been so spectacular that this booklet does not attempt to be complete nor does it contain catalog information showing all the recent new developments in resistance-welding equipment. Instead it serves as a guide to the varied uses of numerous types of resistance-welding equipment in the fabrication of metals.

INFORM-A-GRAM KEY No. 146-C

REAMERS are the subject of a highly informative bulletin just published by the producers of Guild Reamers, THE METAL CUTTING TOOL & MFG. CO., Dept. T-2, 11121 Grand River Ave., Detroit 4, Mich. Guild Reamers are produced from HS steel in sizes from .030 dia; the Carbide Tipped models are sized from .200 dia. They are available in straight, spiral, step, pilot and hand types. The Guild Hallmark guarantees that each Reamer has been made by trained experts in this highly specialized work, a Guild of master craftsmen whose knowledge and experience is concentrated upon accurately producing the exact reamer you require, exactly as you want it.

INFORM-A-GRAM KEY No. 948-C

PUBLICATION PREVIEWS

JOHANSSON GAGE BLOCKS and Accessories are featured in catalog No. 17, just published by FORD MOTOR CO., Dept. TD 157, Johansson Div., Dearborn, Mich. The proper use of inspection gages which are checked with Jo-Block accuracy guarantees virtual identity of dimension to every piece thus manufactured. This assures interchangeability of parts and largely eliminates hand fitting, thereby lowering prices. Ford Johansson Gage Blocks, which are accurate to within a few millionths of an inch, have a sterling reputation for their maintenance of industrial measuring standards.

INFORM-A-GRAM KEY No. C25-C

BOX-TYPE ELECTRIC HEAT TREATER for heat treating processes to 2000° F is described in literature available from the MAHR MFG. CO., Dept. T-4, 1711 N. Second St., Minneapolis 11, Minn. Built in various standard overall sizes up to 54" x 102" x 88", the unit will harden carbon and alloy steels to 1850° F, temper heat treated parts, anneal, normalize or preheat high speed steels. It is also offered as an ideal furnace for experimental and development work, and is available with or without protective atmosphere.

INFORM-A-GRAM KEY No. 379-C

AERO VALVE—A new patented heat and ventilator control unit is announced by SMITH-MAUTZ CO., aircraft parts and accessories manufacturers, Dept. TD, Glendale, Calif. The Aero Valve is many times as efficient as the old type butterfly unit which it replaces. The unit originally was developed for the aircraft industry. Its corrosion resistance and strength assure long, trouble-free operation for any air or heat control application, particularly in the marine, air conditioning, or bus transportation field. The unit has 36 positive control stages, and is designed like a camera shutter, with 15 to 18 shutter segments. Its patented principle of assembly uses a minimum of wearing parts. Further details are available from the company.

INFORM-A-GRAM KEY No. E62-C

McGILL INNER RACE AND ROLLER ASSEMBLY Solidend Multirol Bearing which may be used to great advantage on applications where parts which have been heat treated to obtain surface hardness can be utilized as outer raceways is detailed in Bulletin IR-45 issued by the McGILL MFG. CO., INC., Dept. T-9, Valparaiso, Ind. Designed as a self-contained unit and made in both single and double row, the new bearing is similar in style to the established line of Solidend Multirol Bearings. Rounded end rollers give greater load capacity; absence of loose retaining rings simplifies installation; close tolerance and great rigidity give greater bearing efficiency and eliminate vibration and noise; there are no delicate parts to warp, break or loosen.

INFORM-A-GRAM KEY No. E63-C

NON-CORROSIVE FLUX—Originally developed for the Armed Forces, Zenith Super Flux is now available to private industry by POLAN INDUSTRIES, Dept. T-5, 608 Fifth Ave., Huntington 19, W. Va. Super Flux is ideal for soldering electrical connections and is absolutely non-corrosive. This flux is likewise recommended as a soldering flux on copper, cadmium plated brass and steel, black steel, and to facilitate tinning of soldering tips. It is easily applied by brush or dipping and readily adheres to the work. Additional information is available from the company.

INFORM-A-GRAM KEY No. B73-C

"JEEP" KIT which contains an assortment of diamond tools to meet practically every requirement of medium-sized and small shops has been made available by the ABRASIVE DRESSING TOOL CO., Dept. T-8, Detroit, Mich. The Kit consists of ten diamond tools, two tool holders and two keys for locking tools in the holders. Included are diamond dressing tools, radius tools, cutting tools, phonopoints and a diamond scriber. Each Abrasive G-P Kit bears an identification number and provides a separate compartment for each tool, facilitating inventory and preventing loss. Literature on request.

INFORM-A-GRAM KEY No. 753-C

"RAMS HEAD" STEEL STAMPS for marking letters and numbers are shown in a descriptive circular published by the ACME MARKING EQUIPMENT CO., Dept. T-J, 2222 W. Fort St., Detroit 16, Mich. Chipping and mushrooming of the striking head is eliminated by a special process of heat treatment and tempering. After heat treatment stamps are double drawn in temperature controlled salt baths. Acme also produces a complete line of marking, stamping, and embossing equipment as well as badges, name plates, seals, and shipping room supplies.

INFORM-A-GRAM KEY No. E61-C

PRECISION MACHINED BARS made from a specially tough and strong bearing alloy, Shook 664 Phosphor bronze, are described in an illustrated folder just issued by the SHOOK BRONZE CORP., Dept. T-9, Lima, Ohio. Unusually high compressive strength, thorough uniformity of texture and a dense, wear-resistant bearing surface are among the qualities of this metal. A special die-casting process is employed, designed to give denser grain with radial control of grain. The folder lists over 400 stock sizes of Shook bored bronze bars to enable users to avoid material waste and conserve machining time.

INFORM-A-GRAM KEY No. E59-C

PUBLICATION PREVIEWS

PANTOGRAPH ENGRAVING for the Die and Mold maker, is thoroughly explained in catalog 1580-B published by the GEORGE GORTON MACHINE CO., Dept. T-4, 1209 Racine St., Racine, Wis. The Pantographs on Gorton Machines are completely ball bearing for utmost sensitivity and durability. On 2-dimensional machines any desired reduction may be obtained by means of only two simple adjustments, and only four equally simple ones are necessary for the 3-dimensional machines. Gorton's highly developed tools and gages for all machining and fitting operations insure absolute interchangeability and enable them to build a high degree of accuracy into every machine at a minimum of cost. A free Pantograph demonstration offer is extended to prospective users.

INFORM-A-GRAM KEY No. 711-C

FINE PRECISION Geared to Faster Production is the topic treated in a recent publication of ACE MFG. CORP., Dept. T-5, 1217 E. Erie Ave., Philadelphia 24, Pa. Ace services include: Precision Grinding, Production Machining, Metal Stamping, Heat Treating, Tool and Die work and the production of precision aircraft, radio, instrument and machine parts. Manufacturers who need closer tolerances, speeded up production or solutions to difficult production problems will find at Ace Manufacturing Corporation, industry's finest machines, plus skill, experience and ingenuity at their service.

INFORM-A-GRAM KEY No. 136-C

EX-CELL-O TOOL TIPS, Vol. 20, No. 4, which is devoted to minimizing production costs, has recently been issued by the EX-CELL-O CORPORATION, Dept. T-14, Detroit 6, Mich. Herein are introduced such machines as the Ex-Cell-O Style 112-C Precision Boring Machine and Ex-Cell-O styles 33 and 33L Precision Thread Grinders. Special attention is focused on the expert repair service for Ace Precision Made Spindles. At Ex-Cell-O, all repaired spindles are thoroughly tested to the same standard as are new spindles, just as carefully packed for shipment and each one carries the same guarantee as a new spindle.

INFORM-A-GRAM KEY No. 737-C

ELECTRITE VANADIUM—A high-speed steel carrying 2% more Vanadium and about .30% more Carbon than the conventional 18-4-1 (W-Cr-V) type of high-speed steel is discussed in an illustrated 8-page catalog issued by LATROBE ELECTRIC STEEL CO., Dept. TJ, Latrobe, Pa. Electrite Vanadium can successfully be used to machine heat treated or work hardened material. In most applications it has proved superior to the super high speed steels. It is also recommended for use in machining soft ferrous metals and non-ferrous metals.

INFORM-A-GRAM KEY No. B67-C

GRINDING & FINISHING with Idler Backstands is the subject of a new 8-page booklet by BEHR-MANNING CORP., Dept. T-6, Troy, N. Y., presenting complete engineering and production data on the latest methods for speeding up grinding and finishing operations by conversion from abrasive setup wheels to Coated Abrasive belts. Of immediate importance to all production supervisors, tool and methods engineers and foremen, the new folder permits quick appraisal of the practicability and advisability of conversion for any particular plant or operation. The sound engineering simplicity of the conversion principle, the technical explanation of belt superiority, and the specification range for the various types of backstands, contact wheels and Coated Abrasive belts are presented.

INFORM-A-GRAM KEY No. 110-C

GAGE-LUBE, a Micronoil Electronized Product, is explained in a folder by PROTECTIVE COATINGS, INC., Box 56 TD, Detroit 27, Mich. This practically dimensionless lubricant, with its rust-inhibiting properties, increases gage life by 3 to 10 times. Gage-Lube, because of its non-gumming, non-loading quality is useful on taps, reamers, broaches, punches, dies, and all precision surfaces. The 2 oz size of Gage-Lube, when used a drop at a time, will serve from 2 to 4 weeks on the inspection bench. Among its numerous users, a famous aircraft engine plant found a single daily application of Gage-Lube to close tolerance thread gages reduced replacement costs by 66%.

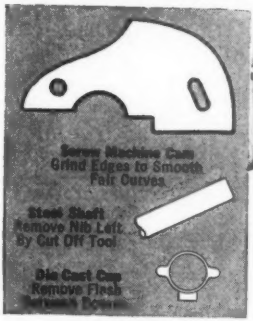
INFORM-A-GRAM KEY No. 434-C

MARKING DEVICES, RUBBER TOOLS & MOLDS as well as Punches and Laboratory equipment are explained in a catalog by THE HOGGSON & PETTIS MFG. CO., Dept. T-8, New Haven, Conn. In addition to standard stock, Hoggson and Pettis can develop from your blueprint or sketch any style of lettering and any design in Marking Dies or produce intricate stamping assemblies in which they specialize. Hoggson and Pettis cementing and vulcanizing tools include steel rollers of standard and special design, narrow and wide stitchers, porcupine rollers and narrow pricker rollers with guard, also awls, fabric hooks and knives. Rollers are obtainable with either plain or ball bearings. The Rubber or Plastic Molds and Dies can either be developed from designs by your own or Hoggson and Pettis engineers who are capable of solving your cutting and molding problems. All Hoggson and Pettis products are noteworthy for accuracy and durability.

INFORM-A-GRAM KEY No. E82-C

18 WAYS TO SAVE TIME & MONEY *with the* MEAD *Industrial Burring Machine*

New circular explains, illustrates 18 ways in which the Mead Industrial Burring Machine saves time and money—also contains special Grit Guide. Every industrial plant needs this "Jack-Of-All-Trades" machine. Your burring can be done in "free time" — install these machines by every machine tool which leaves burrs. Grinds, finishes both outside and inside cut-out openings. Immediate delivery in most cases. Write for the informative Money-Saving circular now.



For METAL - PLASTIC - WOOD

•

MEAD
Specialties Co.
4114 North Knox Avenue
Dept. H-95
CHICAGO 41, ILL.

SAVE TIME

WITH THE *New* CARDINAL AUTOMATIC *AIR VISE*

WRITE FOR BULLETIN

CARDINAL MACHINE COMPANY
GLENDALE, CALIFORNIA
"The -SPEED VISE- Manufacturer"

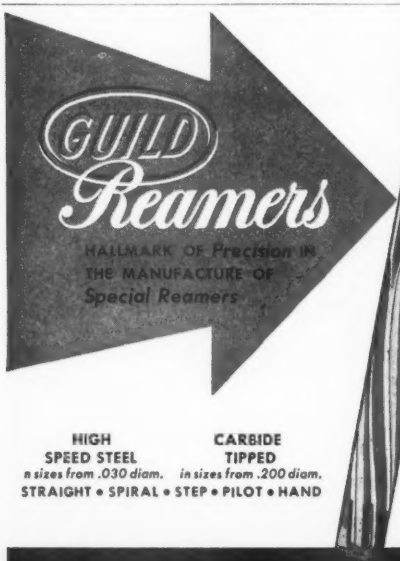
PUBLICATION PREVIEWS

KEMPSMITH MILLING MACHINES. Type G, Plain and Universal models are featured in bulletin No. 102 published by KEMPSMITH MACHINE CO., Dept. D, Milwaukee 14, Wis. All models of Type G Millers have centralized control; eighteen speeds and feeds; speed, feed and spindle assemblies mounted fully on ball bearings; knee gib construction and are available with power rapid traverse (at additional cost). Bulletin No. 102 pictures and explains Type G Millers, which are all-geared for positive power and smooth, chatterless cutting and enumerates their specifications with the available attachments and tools.
INFORM-A-GRAM KEY No. C47-C

ABRASIVE CHUCK SEGMENTS (1945 Edition) recently published by NORTON CO., Dept. J-7, Worcester 6, Mass., illustrates assemblies of segment chucks which are used by all well known manufacturers of standard chucks. Accompanying each of these illustrations is a table of specifications, including list prices. This catalog also contains a conversion table for old and new segment set numbers and corresponding Norton blueprint numbers. Copies are available on request.
INFORM-A-GRAM KEY No. 545-C

BASA REPLACEABLE FACE HAMMERS are introduced in their bulletin B1 by GREENE, TWEED & CO., Dept. J, Bronx Blvd. at 238th St., New York 66, N. Y. The Basa Hammer strikes firm blows to a surface without causing it damage, for it is constructed so that the soft faces absorb the wear of impact and they are easily and quickly replaceable. Basa Hammers are built in five sizes to accommodate faces measuring 1¼" dia to 2¾" dia, available in aluminum, plastic, rawhide, copper and babbitt for hammers including the 2" dia face size. The 2¾" dia faces are available in rawhide, plastic and aluminum. The hammer weights vary from 1¼ lbs to 6 lbs 9 oz, depending upon face materials and hammer sizes. Basa Hammer faces provide protection for practically every type of material which may need to be hammered upon.
INFORM-A-GRAM KEY No. 782-C

YOUNG'S MULTIPLE GAGING MACHINE is featured in a publication by ADROIT MFG. CO., INC., Dept. J, 76 Gerry St., Brooklyn 6, N. Y. The Young's Multiple Gaging Machine was designed and is used principally for gaging in multiple stages, complete contours of intricate parts in one operation, or one dimension can be gaged at a time by a shadowed image formed of an object under high magnification. The method used is extremely accurate, widely applicable and inexpensive in its operation. This device is designed to



● GUILD is the new name for an old established line of reamers whose reputation for accuracy has become outstanding in the manufacture of aircraft—motors—engines—small arms—radios—fine instruments, etc. The name GUILD is stamped on each individual reamer as an identification—a hallmark of finest quality. Quality that is possible only by *creative* and *productive* ability far above the average in the manufacture of *reamers specially built for special purposes.* Write for booklet.

METAL CUTTING TOOLS
AND MANUFACTURING CO.
11121 Grand River Ave., Detroit 4, Mich.
• **HOgarth 9164-5** •

What STERLING is to silver GUILD is to Reamers

PEERLESS Features *That Boost* Production Records

Finger-Tip Control of the feed pressure speeds up accurate setting for maximum Sawing speeds.
Four-Sided Saw Frame permits high blade tension.
Conveyor with automatic, Micro-set Length Gauge can be added right on the job.

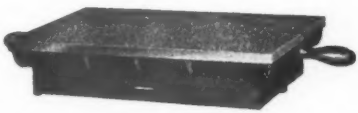
PEERLESS has exclusive features that help make better production records on metal Sawing — Four-Sided Saw-Frame with Blade-Backing Plate, Finger-Tip Feed Pressure Control, Micro-set Length Gauge. These are the principal features that give smooth, vibrationless Sawing at high speeds . . . top quality at lower cost! Your tough metal Sawing operations are simplified when the work is planned for a Peerless Hydra-Cut. Find out how these precision tools—make better production records in your shop. See your local Peerless dealer or write for information.

Write Dept. TDJ-945

PEERLESS
MACHINE COMPANY
RACINE · WISCONSIN

CHALLENGE DUPLEX BENCH BLOCKS

Made in three combinations . . . (1) both sides smooth . . . $14.50 (2) one surface smooth and the other grooved for lapping ½-inch mesh . . . $19.50 (3) both sides grooved . . . $23.50. Semi-steel—precision ground, both top and bottom. Also furnished with either or both surfaces hand-scraped at extra cost. *Double utility.* Can be used as base for small fixtures and tools. One size, 10x14x2⅜-in.



CHALLENGE SURFACE PLATES

A true surface for tool making, testing, and inspection. Built to retain accurate plane surface. Will not sag. Made of close-grained semi-steel—*hand-scraped.* Also furnished with precision ground surface. Felt lined wooden protective cover supplied with each plate. Write us today for full details. 421-C

LATEST CATALOG illustrates and describes the complete line of Challenge Precision Equipment. Send for it at once!

THE CHALLENGE MACHINERY CO.

GRAND HAVEN, MICHIGAN

PUBLICATION PREVIEWS

meet modern mass production of intricate parts and ordnance materials. Chief improvements are due to the introduction of optical gaging methods with their quality of high speed gaging, accuracy and ease in handling.
INFORM-A-GRAM KEY No. 881-C

FRAMES AND SUPPORTS BUILT ON THE JOB, designed by Unistrut Products Co., offer their recently issued literature on this subject. Unistrut consists of a slotted hollow-square steel or other metal section, and standard, spring held nut attachments. Unistrut does not require drilling of holes, riveting or welding, and can be cut to any desired length with a hack saw. Furnished in sections of several sizes or gauges, usually 16 or 20 ft long, but available in shorter lengths. Unistrut is made by UNISTRUT PRODUCTS CO., Dept. T-5, 1065 W. Washington Blvd., Chicago, Ill.
INFORM-A-GRAM KEY No. E65-C

REXALOY OVERLAY ELECTRODES for all ferrous metals and alloys are explained in a recent publication by THE SIGHT FEED GENERATOR CO., Dept. T-3, Richmond, Ind. Rexaloy Electrodes are made in sizes of 1/8", 5/32", and 1/4". They operate well on ac or dc machines in all positions, and moisture does not harm them permanently. Rexaloy deposits can be forged or heat treated and their metallic coating becoming a part of the overlay affords freedom from slag or scale. These deposits have a Brinell hardness rating of from 300 to 687, depending on the base metal. Rexaloy Electrodes will not become brittle after application but will retain, within a few points, original hardness throughout their use.
INFORM-A-GRAM KEY No. E66-C

COLLET AIR CHUCK, MODEL NO. 4, is described in literature by REDMER AIR DEVICES CORP., Dept. T, 601 W. Washington Blvd., Chicago 6, Ill. This new Chuck has a collet capacity of 3½" and will use a special type 3½" master collet. Also available are various size pads to reduce the hole diameter if desired. The No. 4 Chuck permits work up to its maximum capacity to be held to the desired depth as the parts can drop through the entire depth of the chuck. The collet remains stationary and the opening and closing are controlled by the sleeve. As there is no up or down movement of the collet, the depth of the work can be controlled although there are variations in the diameter of the work to be held.
INFORM-A-GRAM KEY No. 794-C

For simplified gang-stamping with faster interchanging of type

HERCULES HOLDERS

Features include:

- Stamps numbers or letters in any untempered metal or material.
- Exclusive extra body and shoulder style of type for added strength.
- No parts to loosen or wear out —made of shock-resisting alloy tool steel.
- Simplest interchangeable type holder made.

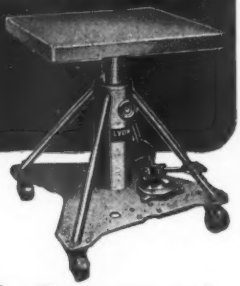
Especially suited for parts numbering on steel, stainless steel and alloys, castings, brass, aluminum, etc., these HERCULES Holders are available in both hand and press styles for one, two line, curved and convexed or concaved marking. Type is removable by mere finger pressure on clip, automatically self-locking in position.

Write for literature

THE ACROMARK CO.

5-15 MORRELL STREET, ELIZABETH 4, NEW JERSEY

POSITION Your Work
so it is at all Times
Convenient
FOR YOUR OPERATOR...



with

LYON-Raymond
Hydraulic ELEVATING TABLE

A few examples of work positioning are listed here, as reported by LYON-Raymond customers, of keeping work convenient for the operator by the quick elevation and lowering of this Hydraulic Elevating Table.

1. Positioned for easy transferring of die in and out of press.
2. Transfers work from one level to another — height positioning.
3. Feeding sheets to shear or press.
4. Adjustable support for overhanging work.
5. As a work table it positions work at right height for all workmen.
6. As a low priced Welding Positioner.
7. Loading or unloading motor trucks.
8. Positioning through hydraulic elevation and full rotation of top in either direction.

Write for BULLETIN 133

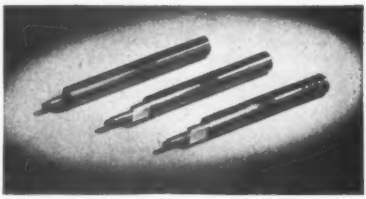
Several Optional Features Available

Deliveries from stock on Standard Models.

LYON-*Raymond* Corporation
451 Madison St., GREENE, N. Y.

PRECISION PARTS

THREE STEPS TOWARD VICTORY



Fast communication between fighting-units gives the all-important coordination that often means the difference between success and failure. These tiny rotor-shafts are a vital part of an Army generator that develops the "juice" to send the messages back and forth.

Stainless steel bar-stock is centerless-ground to a tolerance of .0005". Next, the blanks are machined in automatic screw machines, the knurl being held to .002" on the outside diameter. The flats are straddle-milled and the shaft is completed by thread-grinding the worm.

This is typical of Ace work on small, accurate parts and assemblies involving stamping, machining, heat-treating, and grinding. You'll find Ace facilities and abilities offer many advantages. Send sample, sketch, or blueprint for quotations.

ACE
TRADE MARK

ACE MANUFACTURING CORPORATION
for Precision Parts

1217 E. ERIE AVENUE, PHILADELPHIA 24, PA.

PUBLICATION PREVIEWS

GRINDERS, VERTICAL & DIE Master Power Tools which are widely used in the metal working trades and for metal finishing are introduced in a folder by MASTER TOOL CO., INC., Dept. J, Keith Bldg., Cleveland 15, Ohio. The M-601 Master Power Vertical Grinder is an extremely useful tool with plenty of power for extra heavy duty grinding and polishing. The M-602 Master Power Die Grinder is ideal for rough or precision grinding on dies, for small cone grinding on light castings having small fillets, for burring with rotary cutters and files and for a wide range of polishing work. Included in the descriptive folder are the specifications and speeds of these tools.

INFORM-A-GRAM KEY No. E56-C

FLUID LEVER VALVES which are new to the Numatics Valve line are introduced in literature published by NUMATICS, Dept. D, Milford, Mich. This valve design combines the use of compresed air and electricity to effect control of any single or double-acting air cylinder of up to ¾" pipe capacity. The fluid lever valve principle requires fewer operating parts and makes possible the use of a very small solenoid, drawing only 3.6 amperes at 110 V which is used in all Numatics' models regardless of their size.

INFORM-A-GRAM KEY No. E57-C

HYDRAULIC DRILLING MACHINES, Baush W Type, are described in a circular by the BAUSH MACHINE TOOL CO., Dept. T, Springfield 7, Mass. The capacities of these machines are as follows: Type W-6, 10 hp maximum; Type W-7, 20 hp maximum; and Type W-8, 30 hp maximum, while all three operate at 1800 rpm. All the specifications for Baush W Type Hydraulic Drilling Machines, explanation of their special construction features, besides speeds and feeds are clearly outlined in this circular which is available upon request.

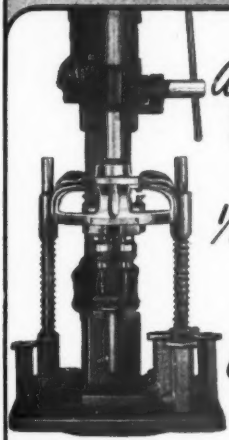
INFORM-A-GRAM KEY No. 204-C

ROGERS VERTICAL TURRET MILL, Perfect 36 Model, for boring, drilling, turning and thread cutting is illustrated in operation and completely described in a recently published catalog of ROGERS MACHINE WORKS, INC., Dept. T, 1807 Elmwood Ave., Buffalo 7, N. Y. Rogers Perfect 36 (36" machining capacity) is the climax to developments and engineering achievements acquired through more than 60 years' experience which are built into every Rogers Vertical Turret Mill. Among the main features of this mill are the adjustable

All Kinds of Springs
NO! Just 1 Kind-
FINEST QUALITY
PRECISION MADE
But all sizes and types of mechanical springs are produced by GIBSON—extension, compression, torsion, motor, flat, heavy hot-wound springs, clips, clamps, wire forms, etc., from standard and special spring materials. What are your requirements? Inquiries invited.
GIBSON-SPRINGS
THE WILLIAM D. GIBSON CO. 1800 CLYBOURN AVE., CHICAGO 14, ILL.
(DIVISION OF ASSOCIATED SPRING CORPORATION)

TWO SPINDLE *Adjustable* DRILL HEADS

Drill Two Holes At Once



✓ *Adjustable Centers from 1/2" to 6"*

✓ *Drill Capacity 0 to 5/8"*

Sleeve and overarm types ... in several sizes. Will double output of any single spindle drill press.

Quickly adjusted to desired drill centers from 1/2" to 6".

Send for bulletin

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PUBLICATION PREVIEWS

five-position main vertical turret and Rogers special swivel side head which can perform two operations simultaneously. The quality workmanship of Rogers' craftsmen, including hand scraping of flat bearing surfaces, is proven by earlier models of Rogers mills which are still in operation after fifty years of service.

INFORM-A-GRAM KEY No. 446-C

TRANSPARENT FACTORY-CARD ENVELOPES made of plastic for holding blueprints, work orders, time sheets, record cards, etc., are being manufactured by the KINGSBACHER-MURPHY CO., Dept. T-9, 683 Santa Fe Ave., Los Angeles 21, Calif. These transparent plastic envelopes are flame-proof, soil-proof and moisture-proof. Available in all sizes in four styles these envelopes are substantially made with bound edges.

INFORM-A-GRAM KEY No. C61-C

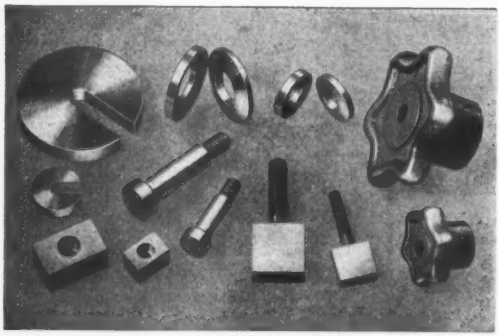
KELLER HANDY PUNCH, which eliminates waste of good punch bodies because of broken inserts, is introduced in a folder by KELLER TOOL & SUPPLY CO., Dept. D, 1364 Poplar Ave., Memphis 4, Tenn. In this new punch body the base of the insert hole ends at the inner side of the set screw hole, thus providing for removal of the damaged insert. Punch bodies are available in two sizes: the 3/8" dia to fit the 3/32" and 4/32" inserts; and the 1/2" dia to fit 5/32", 6/32" and 7/32" inserts. Both punch bodies and inserts are made of special tempered steel for durability and strength.

INFORM-A-GRAM KEY No. E55-C

NATCO HOLEWAY MACHINES are pictorially described in Circular 145 issued by the NATIONAL AUTOMATIC TOOL CO., INC., Dept. T-9, Richmond, Ind. Only one operator is necessary to complete the numerous operations on these machines. They automatically advance two cylinder blocks from station to station, clamp and unclamp them in each position, and synchronously perform the operations at all stations as the blocks travel through the Holeway machines. The blocks are automatically ejected onto a roller conveyor at the completion of all operations.

INFORM-A-GRAM KEY No. E69-C

HIGH-FREQUENCY HEATING EQUIPMENT for Induction heating of metals or other good electricity conductors, or Dielectric heating of nonconducting or highly resistant materials, is explained in a booklet by WESTINGHOUSE ELECTRIC CORP., Dept. T, E. Pittsburgh, Pa. Whether the power source is generator sets or Caltronic equipment for either Induction or Dielectric heating, standard equipment or es-



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Shoulder Screws - Locating Keys
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Output Climbed 60%

WITH A Barker WRENCHLESS CHUCK

Production shot up from 75 to 120 bronze plugs per hour when the Atlantic Brass Works installed a Barker Two-Jaw Wrenchless Chuck. The operations are center, face, and box mill. The lathe is not stopped to set or remove the work.

Barker Wrenchless Two-Jaw Chuck

Barker Wrenchless Three-Jaw Chuck

The experience of this user is typical of the reports from hundreds of manufacturers who are operating Barker Wrenchless Chucks—substantial dividends in more parts per hour, and lower cost per part.

You, too, can have these advantages. Write today for full information!

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Chuck Division
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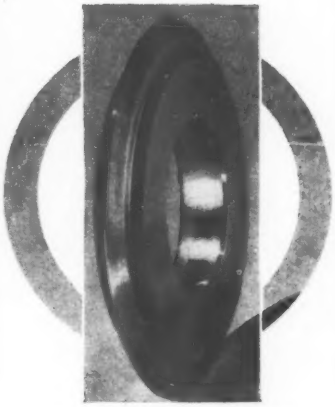

TOOL STEEL TUBING

This slitting tool was made simply by sawing off a thin ring of tool steel tubing and machining a cutting edge. Use of this material eliminated the boring operation.

FREE DATA

on tool steel tubing applications, reprinted from leading tool magazines. Get your copies NOW.

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PUBLICATION PREVIEWS

pecially designed and built apparatus by Westinghouse will fill any need. They can provide all the necessary controls, regulating apparatus and circuit protective devices for dependable, efficient high-frequency power supply.

INFORM-A-GRAM KEY No. 35-C

ALL PURPOSE BRAZING FURNACES are explained in bulletin 201, recently published by LINDBERG ENGINEERING CO., Dept. J, 2450 W. Hubbard St., Chicago 12, Ill. They are designed chiefly for high temperature brazing, with a temperature range of from 1300 degrees F to 2500 degrees F, and are used for low temperature silver brazing, high temperature copper brazing, sintering of powdered metals, bright annealing, general tool hardening and HS steel tool hardening. These brazing furnaces are available in five standard sizes with inside working dimensions of from 6" x 18" x 5" to 18" x 42" x 12".

INFORM-A-GRAM KEY No. 369-C

AIRLESS WHEELABRATOR TABLES of both Multi-Rotary and Plain Table types are introduced by AMERICAN FOUNDRY EQUIPMENT CO., Dept. J, 555 S. Byrkit St., Mishawaka, Ind. They have published five catalogs, each one describing one of the five available sizes of these tables. The Multi-Table machines are supplied in a size range of from 8" dia to 66" dia tables. Plain table machines are supplied with 6' to 12' dia tables. A catalog describing the machine which is the size best suited to individual requirements will be mailed upon request.

INFORM-A-GRAM KEY No. 730.5-C

TYPE SO REGULATOR for the control of suction, pressure or flow in any gas or air flow system is described in Bulletin 1145 published by the HAGAN CORP., Dept. TDJ, Pittsburgh, Pa. Precise regulation over a continuous range of pressures varying from a fraction of an inch water column to fifty pounds per square inch is possible with this regulator. It is used in connection with a power cylinder and a source of oil under pressure to control pressure in a wide variety of industrial heating furnaces where close regulation is necessary, to control gas and air pressure to burners that require uniform pressure for best results, and to control gas or air flow in industrial processes where maintenance of uniform or precisely adjustable conditions is necessary.

INFORM-A-GRAM KEY No. E68-C

Smashing Tapping Records!

Cross section of Tru-Grip Tap Holder showing positive drive to tap.

Thousands of shops report unusual production records with Procunier Tapping Heads because these remarkable heads are built to stand up under the toughest production grind. The exclusive advanced design of the new Procunier Tapping Heads assures you accurate tapping at high speeds with automatic protection for taps! Tap is driven by a double-cone, cork-faced friction clutch which automatically regulates tap driving power by pressure applied through the drill press spindle. Operators can quickly detect full or loaded taps by the "feel," or pressure on the clutch required to drive them thus avoiding needless tap breakage. With this sensitive Procunier smooth operating friction clutch, bottom tapping is as simple as through tapping, since the clutch instantly slips should the tap strike bottom or stick due to tap loading.

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☐ High Speed Tapping Heads
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HY-PRO TAPS

By threading more holes per tap you can increase your production and lower tapping operation costs with HY-PRO Ground Thread Taps.

These high production taps are scientifically produced to give longer, more accurate service, and longer wear between sharpenings.

HY-PRO method of packaging makes crush-proof box a miniature tool box that fully protects taps and offers many time-saving advantages. Tension cover prevents spilling and injury to taps. Legible, informative labels are color-coded to save inventory time, and their position on cover prevents mixing of sizes when taps are returned to box.

PROMPT DELIVERY
Many special as well as standard taps in stock

COMMERCIAL PRECISION SPECIAL
Ground Thread Taps

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New Bedford, Mass., U.S.A.

Accurate Spacing- by the Thousandths

DE-STA-CO ARBOR SPACERS

Save time in setting up milling machine cutters, and wherever accurate spacing must be obtained and *maintained.*

Made of metal. Not only for greater accuracy, but also because they will not be affected by heat or oil. And can be used over and over. Standard sizes from .001" to .0125". Specials, cut from bar stock, in any length and ground to decimal.

Order a set of De-Sta-Co Spacers from your Mill Supply Distributor today.

DETROIT STAMPING CO.
Established Over 30 Years
344 Midland Ave • Detroit 3, Mich.

PUBLICATION PREVIEWS

OIL POWER FLUID MOTORS for converting oil under pressure to rotary motion, is the title of a new booklet offered by the Pump Division of SUNDSTRAND MACHINE TOOL CO., Dept. J, Rockford, Ill. This booklet illustrates and describes the operating principles, features, possible applications and engineering data of Sundstrand Fluid Motors. They provide for simplified power transmission, being equipped with only one rotating part with no mechanical tie between the pistons and wobble plate, they are compact in design and operate smoothly within a wide speed range with little or no maintenance expense.

INFORM-A-GRAM KEY No. 36-C

MODERN SHIPPING CONTAINERS are presented in an illustrated pamphlet entitled "Your Product—How to Ship It Safely at Lower Cost" published by the WIREBOUND BOX MANUFACTURERS ASSOCIATION, P. R., Dept. T-5, 43 E. Ohio St., Chicago 11, Ill. It explains that modern wirebound containers save vital man hours in a shipping department, cut shipping costs and conserve space in a shipping room. Electrical appliances, foundry supplies, dairy equipment and coin machines are only a few of the numerous items now being shipped in this type of container, which adds the strength of steel to wood, to assure maximum protection at minimum weight.

INFORM-A-GRAM KEY No. E48-C

SHAKEPROOF QUICK FASTENERS for facilitating the removal of all types of covers, doors and panels are introduced in a recent bulletin by SHAKEPROOF, INC., Dept. T, 2501 N. Keeler Ave., Chicago 39, Ill. The Shakeproof Application Bulletin illustrates a number of practical uses for Quick Fasteners which are constructed so that they lock parts together strongly and securely for complete protection against the most severe vibration. They not only provide for improved performance of any product but add to it an important sales factor.

INFORM-A-GRAM KEY No. 700-C

HERMETICALLY SEALED ELECTRICAL INDICATING INSTRUMENTS—An illustrated 12-page brochure, explaining the history, uses and advantages of Marion Glass-to-Metal Truly Hermetically Sealed Electrical Indicating Instruments, has been published by the

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NEW—All Quick Change Gear Box

PAYS for itself in 30 Days!

NEW — IMPROVED MODEL

Sold under 30-day Money-Back Guarantee

GUARANTEED ACCURACY! Is guaranteed to cut accurate threads from 4 to 224 per inch with approximately 3/1000 feed for fine turning. It safeguards entire production in process throughout the complete operation.

DRASTICALLY CUTS LABOR COSTS! No time lost finding gears. Inexperienced workmen easily produce top output. Easy to install. You simply drill and tap four holes.

PRECISION CONSTRUCTED! Precision constructed throughout with gears of quality hobbed steel. Gear Box housing is made of high grade aluminum alloy casting—with replaceable bronze bearings.

FOR LOGAN, POWERCRAFT, ATLAS, and CRAFTSMAN, MOODY and CLAUSING . . $135.00 inc. lead screw. If you machine your own lead screw to fit . . $125.00. F. O. B. LOS ANGELES

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PUNCH PRESS PROFITS INCREASE

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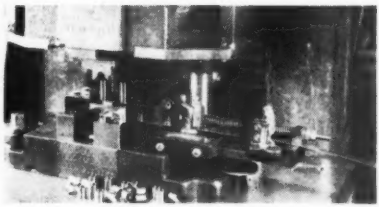
Dickerman Hitch Feed



HERE'S WHY:

1. **Both die and feed can be set up as quickly as die alone.**
2. **Cuts time on either long or short runs.**
3. **Feeds from any position on any style die.**
4. **Positive feed control, adjustable from 0″ to its limit.**
5. **No connection to power shaft required.**

Available in two sizes, 2″ and 4″ feeds.

Dickerman-built by craftsmen for craftsmen.

First cost is very moderate.

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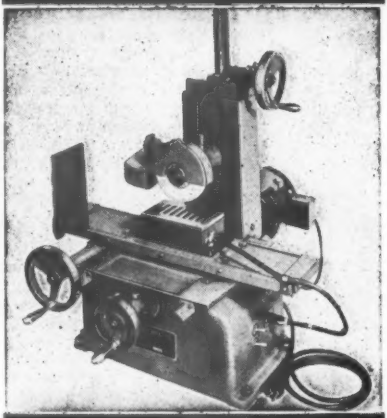

High-Speed BENCH SURFACE GRINDER

ACCURATE WITHIN .0001

A sensitive machine built to rigid standards of accuracy and workmanship specially designed *"For the job that fits in your palm."*

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SANFORD MFG. CO.
1279-81 Springfield Ave.
Irvington 11, N. J.

PUBLICATION REVIEWS

MARION ELECTRICAL INSTRUMENT CO., Dept. TD, Manchester, N. H. The preface of this book deals with the urgent need for "tropicalized" electrical indicating instruments, constructed to resist the destructive action of tropical fungi which impair the efficiency and performance of vitally important war equipment. It also deals with the importance of equipment built to function with sustained accuracy under all types of climatic conditions such as extreme cold, extreme heat and high humidity.

INFORM-A-GRAM KEY No. E49-C

HYDRAULIC INTERNAL & EXTERNAL GRINDERS, Series 103, are fully described in a catalog published by THE GRENBY MFG. CO., Dept. TJ, Plainville, Conn. Each of these grinders may be equipped with a supplementary work head, at additional cost, which will convert the external grinder to an internal grinder, or the internal grinder to an external grinder. The catalog also features various accessories such as a face plate, a radius dresser, three and four jaw chucks and a step chuck for both EG-103 and IG-103 grinders as well as internal spindle quills.

INFORM-A-GRAM KEY No. E45-C

TRULAP JR. MECHANICAL LAPPING which provides a sure method of producing flat surfaces and smooth finishes easily and quickly without use of skilled labor is described in a circular by TRULAP MACHINE CO., Dept. T, 17 W. 60th St., New York 23, N. Y. Trulap Jr. is designed for any manufacturer who has a problem of lapping surface finishes to a tolerance of within one light band or one microinch. Prints or samples of any part that requires lapping may be sent to Trulap Machine Co. In return, they will gladly submit to the manufacturer an estimate of the time required to lap parts to specifications.

INFORM-A-GRAM KEY No. E46-C

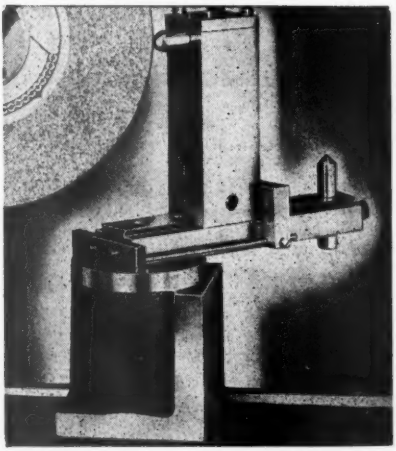
ELECTRIC SALT BATH FURNACE COILS for de-freezing Upton Salt Baths have been recently introduced in bulletin U-212 published by UPTON ELECTRIC FURNACE DIV., Dept. J, 7450 Melville at Green St., Detroit 17, Mich. This new starting coil, consisting of a Chromel-A element, connected to two mild steel bars and operated in conjunction with the transformer, permits the rapid initial freezing or thawing of frozen salt after it has chilled and solidified in the furnace. Upton Electric Division's exclusive development of this fast acting starting coil is characteristic of their advancement in salt bath heat treating that permits users of Upton Furnaces to do better, faster, more accurate heat treating at less cost per pound of work.

INFORM-A-GRAM KEY No. E43-C

THE "FORM-MASTER"

ANGLE & RADIUS DRESSER

A sturdy, quality instrument designed by form-grinding specialists to dress both angles and radius at low cost. Two 1/3 ct. diamonds and instrument case included—$150.00 complete.



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.0001" accuracy obtainable.
Simple to operate.
Reasonably priced.

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*Mastercased
TO GIVE UP TO
500%
LONGER LIFE

*MASTERCASTING . . . that's our improved super-heat-treating process which adds to the life of Masterform cutting tools . . . will multiply your production . . . will divide your costs per cut.

Want proof? Write, wire or phone for name of nearest-to-you factory representative . . . or without the slightest obligation, send specifications for estimates and complete information.

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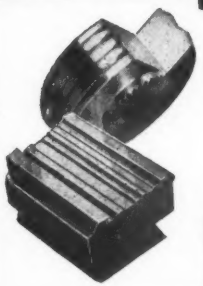

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CUTTING TOOLS

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2552 IRVING PARK ROAD • CHICAGO 18, ILL.
OUTSTANDING ENGINEERING SERVICE AND CRAFTSMANSHIP

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CARBIDE GRINDERS
A MODEL FOR EVERY NEED

Hammond's popular, precision-built, wet grinder (shown) has a 10" cup wheel on each end. It features the patented No Spray - No Splash Coolant System, and Safety Cup Discs which prevent tool being dropped into cup of wheel. Write for complete data.

HAMMOND CARBIDE TOOL GRINDER LINE IS COMPLETE • A MODEL FOR EVERY NEED
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EASTERN BRANCH 71 WEST 23rd ST., NEW YORK 10, N. Y.

PUBLICATION PREVIEWS

ALLEN SANI-SPRAY, DUAL PURPOSE, for cleaning and fog-proofing glasses and goggles, is featured in a bulletin by the ALLEN OPTICAL CO., Dept. D, 15-17 Allen St., Buffalo 2, N. Y. Especially designed for applying Sani-Spray, the Allen Goggle Station is an atomizer installed in a heavy gauge, all metal wall cabinet which holds a refillable quart jar of Allen Sani-Spray, a supply of tissue paper, and a built-in receptacle for used cleaning tissue. The Allen Goggle Station is simply push button operated to release regulatable pressure provided by connection to the standard plant air line. Clean lenses and clear vision achieve economies through greater individual output of production and reduce hazards created by cloudy glasses.

INFORM-A-GRAM KEY No. E42-C

METAL-CUTTING TOOLS, made from Haynes Stellite 98M2 and Star J-Metal alloys, are described in a new 52-page catalog published by HAYNES STELLITE CO., a Unit of Union Carbide and Carbon Corp., Dept. T-5, Kokomo, Ind. Descriptions, illustrations, engineering drawings, specifications, and prices for standard tools manufactured by the company are included. Among the tools discussed are square, rectangular, and round tool bits; boring and reaming blades; tipped tools and tool tips; grooving tools; cut-off tools; insert milling cutter blades; shell end mills; wear strips; and special tools. Recommendations for cutting angles, speeds and feeds for turning, boring and milling plain and alloy steels, cast steel, cast iron, stainless steel, bronze, brass and aluminum are given.

INFORM-A-GRAM KEY No. 313-C

Extreme **FLEXIBILITY**
for **VARIED TOOLROOM JOBS**

Here's a real money maker for your shop . . . the ideal machine to handle those fussy little jobs that so often bottleneck a busy toolroom. For milling, jig boring, die making, models, metal patterns, jigs, etc. Easy set-up, fast changeover. Saves larger machines for their rated capacity. Smooth running . . . 8 speeds to 4250 r.p.m. . . . 7″ x 17½″ table . . . 18½″ x 20″ floor space.

Pays for itself quickly . . . small investment.

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3-Point Base Insures Even Cuts

Off-balance bandsaws, caused by uneven flooring, often account for uneven cuts. Not so, however, where the Johnson Metal Cut-Off Bandsaw is used. The exclusive 3-point base provides rigid anchorage. No matter how uneven the flooring, the Johnson Bandsaw sets solid, prevents irregular cuts.

Other Important Johnson Features

1. Thinner blade reduces metal waste
2. Box type frame protects movable parts
3. Four speeds provide right speed for every metal, hard or soft
4. Hydraulic control insures even pressure throughout cut
5. Coolant attachment minimizes friction, prolongs blade life
6. Automatic shut-off after cut is completed

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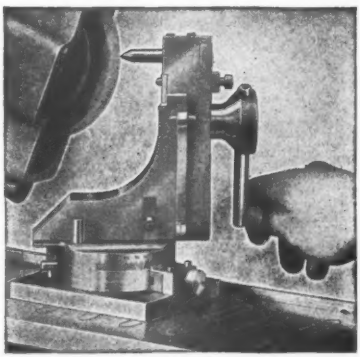
Fluid-motion

for modern form-dressing

ONE SETTING
HANDLE
CONTINUOUS MOTION

The J & S Model "E" Radii and Angle Dresser in the new "Fluid-motion" series is one of the finest precision dressing instruments procurable—regardless of cost.



FEATURES

Fluid-motion dressing
.0001" accuracy
Automatic centering
14" wheel capacity
Large range yet compact
Chatterless and dustproof

J. & S. TOOL CO.
477 MAIN ST. E. ORANGE 4, N. J.

PUBLICATION PREVIEWS

GAUGES & DIAL INDICATORS are introduced in catalog No. 53 published by B. C. AMES CO., Dept. T-9, Waltham, Mass. In their production of gauges and indicators, the chief concern of B. C. Ames has always been the best quality rather than the largest quantity. B. C. Ames has patented several of their product features such as the wire attached bezel, finger fit crystal, cup dial and the one-staff wheel assembly. Although this catalog describes models which for years have proved to be the best for general testing and measuring, many special gauges and indicators are being made for customers who have particular designs of their own. Drawings and information about any desired type supplied on request and without charge.

INFORM-A-GRAM KEY No. 189-C

"HOW TO BUY PRODUCTION-TIME" is the title of a 24-page, pocket-size booklet describing the qualities and accomplishments of the revolutionary, new Cool-Cut Grinding Wheels producd by ROBERTSON MFG. CO., Dept. T-9, Trenton 5, N. J. Described as "a booklet that will tell you things about grinding wheels you never knew before", it is being offered free to manufacturers interested in cutting down production-time in their grinding departments. Cool-Cut wheels are supplied in all standard sizes for use on various types of

Wet Cutting PRACTICAL at Highest Speeds

Now — it is possible to cut metal to lengths with phenomenal speed. The ONLY built-in, off-the-floor coolant-model band saw that combines portability, convenient operation and which has a "dripless" enclosed band saw frame.

Triples production — lengthens life of saws — makes heaviest cuts on hardest metals at production speeds. The SAW of advanced design with EXCLUSIVE FEATURES.

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MACHINE TOOL DIVISION
KALAMAZOO TANK & SILO CO., Kalamazoo 16, Mich.
In Canada — BRIDGE MACHINERY CO., Montreal

Kalamazoo Metal Cutting Band Saw

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Original Accuracy *Maintained*

Noted for maintaining original accuracy over a longer period. Criterion Heads are smooth, compact, rigid. Parts subject to wear are hardened. Lead screw is hardened tool steel, with threads ground from solid after hardening. All heads have large, graduated dial. Large offset adjustment eliminates need for offset boring bars. Two sizes: 1½" and 3". ½" and 1" bar capacity. Shanks are interchangeable, enabling operator to use head on different machines. Ideally adapted for slide boring tool holder on small turret lathes. Ask your dealer or order direct. Request free literature.

Lead Screw ground from solid AFTER hardening.

CRITERION MACHINE WORKS
BEVERLY HILLS, CALIFORNIA

New THREAD PICK-UP PROJECTOR
INCREASES GRINDER PRODUCTIVITY
AS MUCH AS 50% . . . SOMETIMES MORE!

- Reduces grinding time
- Wheel and Diamond Life greatly prolonged
- Salvages threaded parts oversize .0003 or more
- Stock removed equally from both flanks
- Beginners can use expertly — quickly

The Thread Pick-up Projector is an optical device for setting the driving dog on pre-threaded work. Allows grinding wheel to enter trough of thread to remove finishing stock from both flanks accurately and without adjustment. Lead is picked up while previous piece is being ground — no time is lost. Viewing screen enlarges thread for quick, accurate check of root depth and angle. Picks up A. N., Acme and Whitworth threads. Operates in conjunction with any thread grinder.

Write for BULLETIN No. 441 today!

ACME INDUSTRIAL CO.
(SCIENTIFIC DIVISION)

206 N. LAFLIN STREET
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PUBLICATION PREVIEWS

grinding machines, using both Aluminous Oxide and Silicon Carbide abrasives. The former is recommended for all hard and soft steel; the latter is desirable for tungsten carbide-tipped tools and all other metals of low tensile strength.

INFORM-A-GRAM KEY No. E89-C

DRILLING & TAPPING TURRET HEADS are featured in a folder published by CHICAGO DRILLET CORP., Dept. T-6, 919 N. Michigan Ave., Chicago 11, Ill. Time studies made by hundreds of production men show that the Quadrill cuts costs, for through its use, drilling, counterboring, spot-facing and tapping can be accomplished without waste of tool changing time. Besides being accurate and dependable, the Quadrill is distinguished by its positive drive which is independent of friction. The design incorporates two precision type ball bearings on each spindle and all hardened and ground surfaces, with attachable tapping heads. Every Quadrill gets an actual test in operation before shipment.

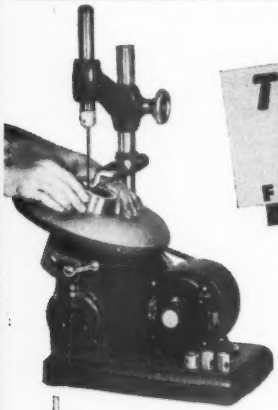
INFORM-A-GRAM KEY No. B34-C

DIE SETS & DIE MAKERS SUPPLIES, Sixth Edition, is published by DETROIT DIE SET CORP., Dept. T-4, 2895 W. Grand Blvd., Detroit 2, Mich. This 48-page, complete catalog lists and fully illustrates all these products including: 16 standard model, all steel and semi-steel die sets; leader, shoulder and dowel pins; bushings; steel punch shanks; die springs; socket head cap and set screws; socket head stripper bolts; toggle clamps; and specially made bolster, stripper and pressure plates of steel. For the convenience of users, all these necessities for die making are carefully described as to specifications and their prices are listed. In addition, Detroit Die Set Corporation has flame cutting and welding facilities which well equips them to produce special semi-steel or all steel Die Sets in many sizes and shapes.

INFORM-A-GRAM KEY No. 674-C

DUPLIMATIC Automatic Machine Tool Control is explained and illustrated in a folder published by DETROIT UNIVERSAL DUPLICATOR CO., Dept. T-73, 723 E. Milwaukee Ave., Detroit 2, Mich. This mechanical operator turns one, two, or three feed screws of any machine tool automatically and simultaneously, yet independently of one another to do contouring at speeds and accuracies beyond human capacity. Except for loading and unloading the work, the operator need only press one of the four buttons on the control panel. Duplimatics are not limited to any one type of work and they can be used with virtually any machine tool.

INFORM-A-GRAM KEY No. 34-C



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Take advantage of treatments available here which often improve tools 30% to 60% or more. We have specialized in tool treating for a quarter-century. The war has brought new and better methods for original hardening, and also for supplementary treatings of tools purchased in hardened, finished condition.

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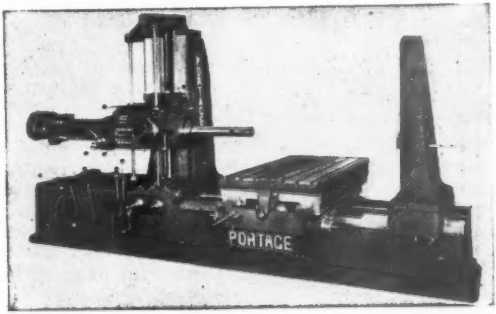

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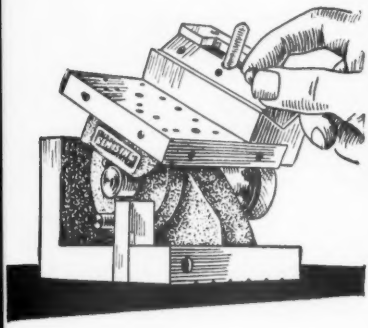

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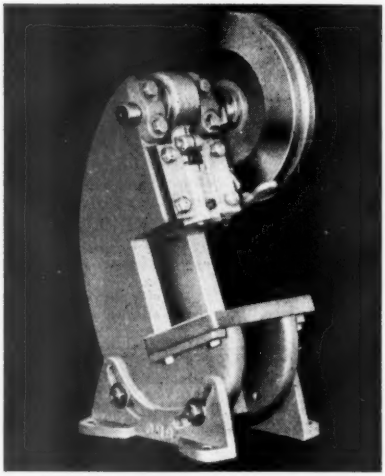

it is a high speed machine, ideal for handling light sheet metal, plastics and small parts. It stamps, crimps, marks, rivets, forms and performs many special operations.

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Additional information and literature available on request to the company, attention Dept. TD.

INFORM-A-GRAM KEY No. 169-C

To obtain literature and additional data on products given editorial mention in this issue, please use the convenient postage-free INFORM-A-GRAM post cards on page 178-A.

C-F POSITIONERS

Modern Production Welding is done on C-F Positioners — without crane assistance, without sling crews, without extra floor space for "flopping" the weldment around so that all sides can be welded "down hand". On a C-F Positioner, the welder himself tilts and turns the weldment to position with a push button control — can tilt it up to 135° beyond horizontal, turn it to any angle or rotate it at any speed from 0 r.p.m. up.

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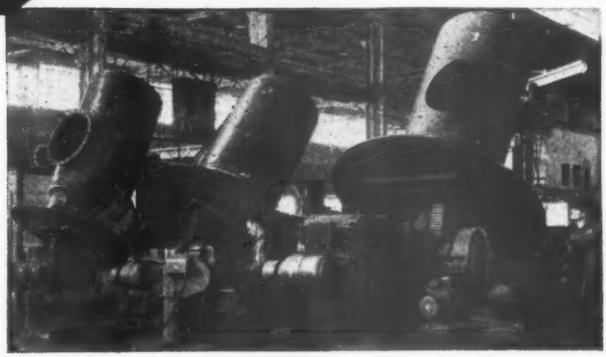

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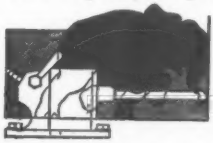

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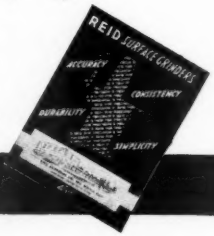

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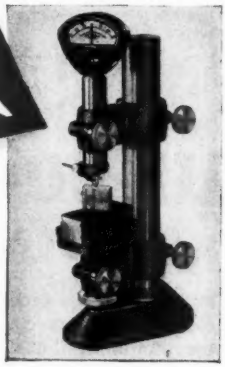

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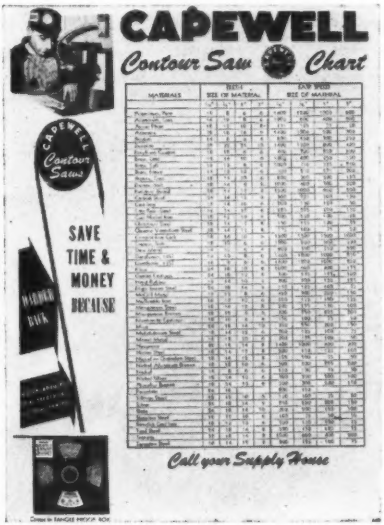
CONTOUR SAW CHART. To assist the saw operator in selecting the proper Capewell Contour Saw, The Capewell Manufacturing Co., Dept. TJ, Hartford 2, Conn., has issued a saw chart which lists material stock sizes from $\frac{1}{16}$" to 3", the proper saw to use with the number of saw teeth per inch, and the recommended saw speeds for material thickness. This information is set up in table



form for 52 different kinds of materials with metals on one side of the chart, and plastics, wood, builder's board and miscellaneous materials on the other side. A decimal equivalent table is also given. The chart is printed on 11" x 14" cardboard stock. To secure your copy of this chart use our postage-free Inform-a-Gram card on page 178-A.

INFORM-A-GRAM KEY No. 117-C

THE MILLING MACHINE AND ITS ATTACHMENTS, a new 83-page booklet, has just been published by the Kearney & Trecker Corp., Milwaukee 14, Wisconsin. This is book No. 2 in the Milling Practice Series being published by this company. Divided into nine chapters, it covers the knee and bed types of milling machines, their attachments, and their operation. Complete explanations and many illustrations make it a valuable aid in the education and training of shop personnel. Copy sent on request to the company, attention Dept. TJ.

INFORM-A-GRAM KEY No. 592-C

"BEARING RACES IMPROVED BY ISOTHERMAL TREATMENT." A technical treatise by J. Paul Deringer, chief metallurgist, Jack & Heintz, Inc., is offered by Ajax Electric Company, Dept. TJ, Frankford Avenue at Delaware, Philadelphia 23, Pa. Because Jack & Heintz, Inc., was unable to obtain sufficient ball bearings for its production of automatic pilots, generators, starters and other aircraft accessories, a new plant was established exclusively devoted to ball bearing manufacture. In exploring the field to find the best manufacturing process, it was found the methods currently employed in heat treating consisted of a conventional quench and temper. Characteristic difficulties with distortion required piece-by-piece handling and die-press quenching of the larger sized bearing races, yet resulted in an average 0.003" out-of-round on 2.835" rings, which was excessive and had to be overcome with new methods and equipment. Thorough inquiries about methods and equipment were made, and sample pieces were hardened by various methods. Ajax Electric Company metallurgists submitted samples treated by the isothermal process. A study of the time-temperature-transformation curve for an SAE 52100-B steel indicated that a "martempering" treatment in molten salt, rather than an austempering, would produce the required physical properties. Martempering is a method of interrupted quenching to obtain a structure of martensite with a minimum of residual hardening strains.

SHOP AIDS

Mr. Deringer discusses the operation of the Ajax Electric furnaces which were installed, the procedures, and results which produced bearing races practically free from distortion without resorting to die press quenching.

INFORM-A-GRAM KEY No. 68-C

"SKIN RECOVERY" or carbon restoration process by the use of a controlled gas atmosphere is described in a new bulletin No. SC-125 just issued by Surface Combustion Corp., Toledo 1, Ohio. Application of the process in preventing decarburization of various steels and how it differs from the process of carburization is also covered. Applicable to both carbon and alloy steels, the bulletin brings out the desired value of maintaining the carbon content of the surface of the material in preventing reduction of its endurance limit under repeated stresses and often eliminating the need for machining operation subsequent to heat treatment. Various photomicrographs indicate the effect of the process on several types of steels. Charts showing the unbalanced carbon concentration from surface to core metal obtained by the carburizing process and the balanced condition when the skin recovery process is used are also included. To illustrate the difference between normal heat treatment and skin recovery process, a chart of Vickers Micro-Hardness for depths up to 0.050" for both treatments is shown. Carbon content of the original material is maintained within .03% by the latter process.

Since the principal requirement in applying the process is that the work be heated in a chamber wherein both air and flue gases can be completely excluded, illustrations of Surface Combustion furnaces of both batch and continuous type in which this requirement is met are also included. This bulletin is available on request from the company, attention Dept. TJ.

INFORM-A-GRAM KEY No. 810-C

CARBIDE TOOL CONSERVATION can be promoted through the use of Firthite field service posters with their reminders in simple, easy-to-take, understandable manner, of the right ways to make carbide tools do their utmost. These posters concern: use of the proper tool; handling tools with care; setting tools correctly; keeping tools sharp; grinding tools properly; and caution against using too much force while grinding carbide tools. The drawings were done by cartoonist Cy Hungerford, in his humorous and forceful style. Their size is 17" x 22" and they are printed in four colors. The conservation of carbide tools through proper handling and correct usage is

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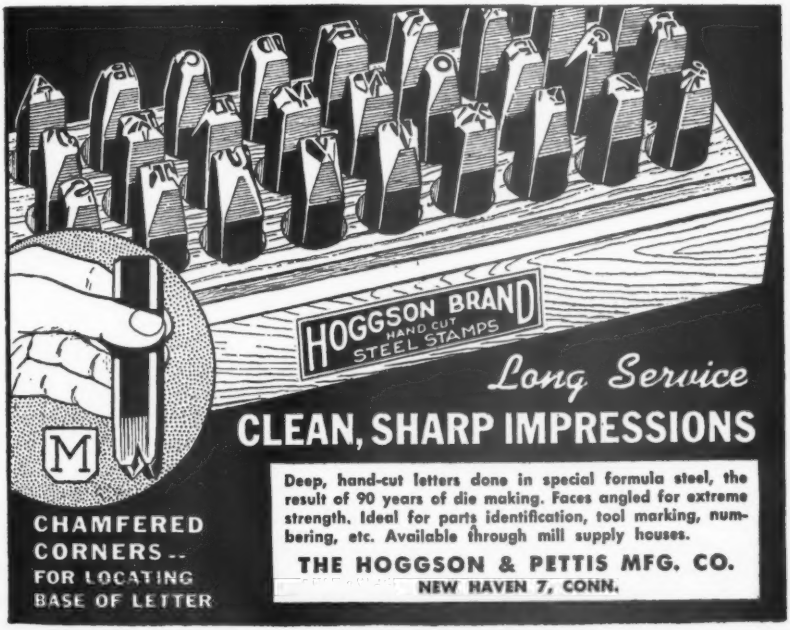

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essential not only in wartime but at any time for the best production results and low operating costs. Firthite field service posters in sets of six are available upon request to Firth-Sterling Steel Co., Dept TJ, McKeesport, Pa.

INFORM-A-GRAM KEY No. 10.5-C

CALCIUM METALLURGY AND TECHNOLOGY. Monograph Series No. 100 by C. L. Mantell, Consulting Chemical Engineer and Chas. Hardy, President of Chas. Hardy, Inc. This volume is intended to supply information on the properties of this interesting earth-metal, calcium, and to suggest many new applications of value in the metallurgical and chemical fields. Extremely small amounts, almost of the order of traces of calcium, exert tremendous influence on the properties of alloys. As an example, 0.03 percent calcium in alloys of the 80 nickel-20 chromium type employed for high-temperature electrical resistance applications increases the service life many times. The authors have been associated with the metallurgical development of calcium production, technology, metallurgical use, development of applications, and commercial distribution over the past two decades. Published by the Reinhold Publishing Corp., 330 W. 42nd St., New York, N. Y., and priced at $3.50.

DIGEST OF CORROSION PREVENTIVE SPECIFICATIONS is a 63-page booklet published by E. F. Houghton & Co. Specifications covering Corrosion Preventives for Army Ordnance, Army-Navy Aeronautical, joint Army-Navy and Navy are given, together with the material or equipment to which the corrosion preventives apply, and the recommended Houghton product which meets the specification.

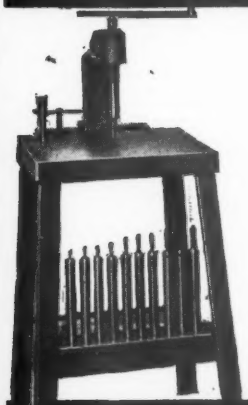
The specifications set forth a description of the compound, its application, uses, and physical properties and test requirements.

A request to E. F. Houghton & Co., Dept. TJ, 303 West Lehigh Ave., Philadelphia 33, Pa., will bring you a copy.

INFORM-A-GRAM KEY No. 324-C

TABLES FOR COMPUTING CHANGE GEARS. A new and enlarged edition of its convenient booklet of tables, useful in computing change gears for hobbing machines in cutting helical gears, etc. (Bulletin No. T-45), has recently been brought out by Michigan Tool Company. Bound in a "grease proof" cover, for longer service life in the shop, the booklet includes such new material as approximate

A "PAIR" THAT'S HARD TO BEAT



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SHOP AIDS

feeds and speeds for rough and finish hobbing of gears made from cast iron, bronze, various types of plain and alloy steels, fiber, rawhide, and micarta. Also included is an explanation of how to obtain exact size measurements of external and internal helical involute gears by the so-called "Ball Method". Text, formulae and drawings have been combined to insure quick comprehension of the method. All other material contained in the original edition of the booklet—how to estimate hobbing time; change gear formulae; change gear tables; decimal equivalents of fractions, etc.—have been retained in the new edition.

A request to Michigan Tool Company, Dept. TJ, 7171 E. McNichols Rd., Detroit 12, Mich., will bring a copy of Bulletin No. T-45.
INFORM-A-GRAM KEY No. 47-C

SANDING AND FINISHING. To acquaint coated abrasive users with the newly announced system for identifying coated abrasives by carborundum, The Carborundum Company has prepared "SANDING AND FINISHING," an 84-page book containing information about coated abrasives, including a complete explanation of the new system and new End Use names for all coated abrasive products. Also there are comprehensive recommendations for the use of coated abrasive products in metal-working, woodworking, shoe and leather, floorsanding, printing, plastics, pipe and hat trades, specifications for belt sanding, belt splices and speeds. "SANDING AND FINISHING" is available to

all bona fide industrial users of coated abrasives. Simply write on a business or company letterhead to The Carborundum Company, Dept. TD, Niagara Falls, N. Y.
INFORM-A-GRAM KEY No. A10-C

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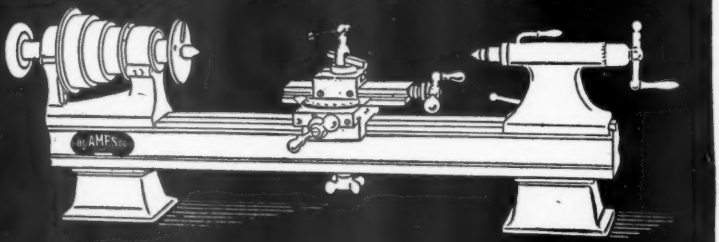

CARBURIZERS—Liquid & Solid
Park Chemical Co.
CASTINGS—Air & Oil Hardening, Cast-to-Shape
Allegheny Ludlum Steel Corp., Forging & Casting Div.
CASTINGS—Nitri-cast-Iron
Allegheny Ludlum Steel Corp., Forging & Casting Div.
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CENTERS—Live
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Sturdimatic Tool Co.
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Cerro de Pasco Copper Corp.
CERROBEND (Also see Alloys)
Cerro de Pasco Copper Corp.
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Cerro de Pasco Copper Corp.
Die Supply Co.
CHAMFERING MACHINES
Builders Iron Foundry
CHAMFERING TOOLS
Nobur Mfg. Co.
CHARTS—Plane, Spherical, Compound
Needham, E. H.
CHASERS—Thread
U. S. Machine Tool Mfg. Corp.
CHECKING DEVICES
Electrix Corp.
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Scherr Co., Inc., George
CHROMIUM PLATING
Hartford Chrome Corp.
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Erickson Tools
Gorton Machine Co., George
Hardinge Brothers, Inc.
Universal Engineering Co.
CHUCKS—Drill
Gorton Machine Co., George
Jacobs Mfg. Co., The
Lee Co., E. O.
CHUCKS—Lathe
Acme Tool Co.
CHUCKS—Magnetic
Acme Tool Co.
Rockford Magnetic Products Co.
CHUCKS—Wrenchless
Thomas Hoist Co.
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Cincinnati Tool Co., The
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Detroit Stamping Co.
Gibson Co., The, William D. (Div. of Associated Spring Corp.)
Howell Clamp Co.
Knu-Vise, Inc.
Mead Specialties Co.
Slewek Tool Div. of Domestic Industries, Inc.
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Danly Machine Specialties, Inc.
CLAMPS—Toggle
Danly Machine Specialties, Inc.
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Detroit Stamping Co.
Knu-Vise, Inc.
CLAMPS—Toolmakers Parallel
Lufkin Rule Co.
CLEANERS—Metal
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CLINOMETERS
Acme Tool Co.
CLIPS
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Zagar Tool, Inc.
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Bellows Co., The
Erickson Tools Co.
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Tomkins-Johnson Co., The
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Gray-Mills Co.
COOLERS—Air
Niagara Blower Co.
COOLING SYSTEMS—Spot Welder
Gray-Mills Co.
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Genesee Mfg. Co., Inc.
Mohawk Tool Co.
National Twist Drill & Tool Co.
Putnam Tool Co.
Wesson Products Co.
COUNTERBORES—Adjustable
Clark Co., Robert H.
COUNTERBORES—Special
Detroit Reamer & Tool Co.
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Gairing Tool Co., The
Severance Tool Industries, Inc.
Wesson Products Co.
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Cullen-Friestedt Co.
CUT-OFF MACHINES
Challenge Machinery Co., The
Delta Mfg. Co.
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Gairing Tool Co., The
Gorton Machine Co., George
CUTTERS—Deburring
Severance Tool Industries, Inc.
CUTTERS—Diamond Glass (See DIAMOND GLASS CUTTERS)
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Gorton Machine Co., George
Tomkins-Johnson Co., The
CUTTERS—Engraving
Gorton Machine Co., George
Preis Engraving Co., H. P.
CUTTERS—Fly
Clark Co., Robert H.
CUTTERS—Gasket
Clark Co., Robert H.
CUTTERS—Hand Power
Lewthwaite Machine Co., T. H.
CUTTERS—Hard Carbide
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Firth-Sterling Steel Co.
Ford Mfg. Co., Inc., M. A.
Gairing Tool Co., The
Gorton Machine Co., George
National Twist Drill & Tool Co.
Pipe Machinery Co., The
Putnam Tool Co.
Severance Tool Industries, Inc.
Super Tool Co.
Tomkins-Johnson Co., The
Wesson Products Co.
CUTTERS—Hole—Adjustable
Clark Co., Robert H.
CUTTERS—Thread Milling
Armstrong Bros. Tool Co.
Gairing Tool Co., The
Pipe Machinery Co., The
Sossner Tap & Tool Co.
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Wesson Products Co.
CUTTERS—Wire Rope
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Allegheny Ludlum Steel Corp.
Wesson Products Co.
CUTTING TOOLS—Special
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National Twist Drill & Tool Co.
Super Tool Co.
U. S. Machine Tool Mfg. Corp.
Zimmerman Packing Co.
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Anker-Holth Mfg. Co.
Mead Specialties Co.
Tomkins-Johnson Co., The
CYLINDERS—Hydraulic
Tomkins-Johnson Co., The

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McKinney Tool & Mfg. Co.
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Eastern Etching & Mfg. Co.
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DIAMOND HONES
Carborundum Co.
DIAMOND POWDERS
Arc Abrasive Laboratories
DIAMOND TOOLS
Diamond Tool Co., Not Inc.
Koebel Diamond Tool Co.
Smit & Sons, Inc., J. K.
Wheel Trueing Tool Co.
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Lester-Phoenix, Inc.
DIE CENTERS—Hard Carbide
Firth-Sterling Steel Co.
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Illinois Tool Works
Milwaukee Chaplet & Mfg. Co.
Oliver Instrument Co.
DIE HANDLING TRUCKS
Hamilton Tool Co., The
DIE MAKERS' SUPPLIES
Acme Industrial Co.
Carboloy Co., Inc.
Continental Machines, Inc.
Danly Machine Specialties, Inc.
Detroit Die Set Corp.
Die Supply Co.
Producto Machine Co., The
Star Machine & Tool Co.
DIE SECTIONS—Composite Steel
Allegheny Ludlum Steel Corp., Forging & Casting Div.
Firth-Sterling Steel Co.
DIE SETS
Danly Machine Specialties, Inc.
Detroit Die Set Corp.
Die Supply Co.
Producto Machine Co., The
DIE STEEL (See STEEL — Tool & Die)
DIE STOPS—Automatic
West, R. C.
DIE SUBSTITUTE MACHINES
O'Neil-Irwin Mfg. Co.
DIES
Alofs Mfg. Co.
Armstrong Bros. Tool Co.
Barth Stamping & Machine Works
Bloomfield Tool Corp.
Bone Tool & Gauge Co.
Davis Tool & Engineering Co.
Denning Mfg. Co., The
Dressel-Betz Co.
General Die & Tool Co.
Hartley Wire Die Co.
Lorain Machine & Tool Co., The
Master Gauge Co.
McKinney Tool & Mfg. Co., The
National Machine Tool Co.
Paramount Tool Co.
Rane Tool Co., Inc.
Schrauer & Co., A. P.
Triangle Engineering Co.
Variety Machine & Stamping Co.
Viking Tool & Machine Corp., The
Whistler & Sons, Inc., S. B.
DIES—Bolt
Armstrong Bros. Tool Co.
DIES—Carbide
Firth-Sterling Steel Co.
DIES—Die Casting
Federal Tool Corp.
DIES—Forming
Algoma Products
DIES—Master Washer
Horis Screwlock Co.
DIES—Pipe
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DIES—Plastic Molding
Federal Tool Corp.
DIES—Press Brake
Dreis & Krump Mfg. Co.
DIES—Punch Press
Federal Tool Corp.
DIES—Punching & Notching
Whistler & Sons, Inc., S. B.
DIES & STOCK SETS
Armstrong Bros. Tool Co.
DIES—Template
Algoma Products
DIES—Threading
Armstrong Bros. Tool Co.
DISCS—Abrasive
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Better still order one trial casting. No charge if claims not borne out. That puts it up to us.

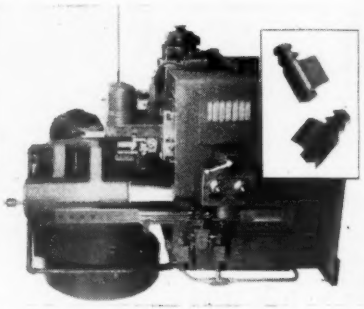
THE ADVANCE FOUNDRY CO.
DAYTON 3, OHIO

STRENES METAL
DRAWING AND FORMING DIE METAL

Automatic Bar Stock Machine

A new machine for automatically milling and cutting off parts from bar stock at extremely high production rates has been introduced by Kent-Owens Machine Co., Dept. DJ, Toledo 10, Ohio. Operating entirely automatically, one operator can tend two or more machines, his only duty being to insert new bar lengths as they are exhausted.

This machine is ideally suited for the



manufacture of hinged parts, pole pieces, turbine blades, molding hardware and many other parts. The illustration shows a setup for milling turbine blades. The crescent shaped bar stock is automatically fed against an end stop by a torque motor and then clamped hydraulically. The head has three cutter spindles. Form cutters on the two lower spindles form mill the blade as shown, and a saw on the upper spindle cuts the blade off to length. The cycle of the head is as follows: (1) Rapid down, (2) Form mill by cutters on two lower spindles, (3) Rapid down, (4) Cut off by saw on upper spindle, (5) Reverse and rapid up to starting position. As the head returns to its upper position, the bar stock is unclamped, advanced into position by the torque motor for a new part and again clamped. All these movements are continuous and automatic. The head is actuated hydraulically with proper adjustments so that any desired cycle or feed rate may be attained. Provided with proper fixtures and clamping jaws various cross section shapes of bar stock can be accommodated, or simple cut-off operations can be done with a single spindle head.

INFORM-A-GRAM KEY No. 345.5-C

DOWEL PINS
Acme Industrial Co.
Danly Machine Specialties, Inc.
Detroit Die Set Corp.
Die Supply Co.
Producto Machine Co., The
DRAWBARS
General Die & Stamping Co.
DRESSERS—Angle
J & S Tool Co.
DRESSERS—Diamond
Carboloy Co., Inc.
Meyers Co., Inc., W. F.
DRESSERS—Radius
J & S Tool Co.
Scherr Co., Inc., George
DRESSERS—Wheel
Lee Co., K. O.
DRESSING STICKS
Carborundum Co.
Norton Co.
DRILL DRIFTS
Armstrong Bros. Tool Co.
DRILL JIG BUSHINGS
Acme Industrial Co.
Colonial Bushings, Inc.
DRILL POINTERS
Oliver Instrument Co.
DRILL PRESS (See PRESSES—Drill)
DRILL ROD
Allegheny Ludlum Steel Corp.
Darwin & Milner, Inc.
Latrobe Electric Steel Co.
DRILLING ATTACHMENTS
Rusnok Tool Works
DRILLING—Disintegrator
Elox Corp.
DRILLING HEADS—Adjustable
Linderme Machine & Tool Co., Inc.
DRILLING HEADS—Turret
Madco Products, Inc.
DRILLING MACHINES
Sommer & Adams Co., The
DRILLING POSTS
Armstrong Bros. Tool Co.
DRILLING & REAMING MACHINES—Deep Hole
Builders Iron Foundry
DRILLS—Carbide Tipped
Goral Tool Co.
DRILLS—Core
Ex-Cell-O Corp.
DRILLS—Form
Conner Tool & Cutter Co.
DRILLS—Hardsteel
Black Drill Co. (Div. Black Industries)
Die Supply Co.
DRILLS—High Speed, Straight Shank
Eastern Tool Supply Co.
DRILLS—Oil Hole
Detroit Reamer & Tool Co.
DRILLS—Ratchet
Armstrong Bros. Tool Co.
DRILLS—Tool-Forged
Republic Drill & Tool Co.
DRILLS—Sensitive
Production Machine Co.
DRILLS—Special
Detroit Reamer & Tool Co.
DRILLS—Twist
Cleveland Twist Drill Co.
National Twist Drill & Tool Co.
DRIVES—Gearshift
Lima Electric Motor Co., The
DRIVES—Motorized
Master Electric Co., Industrial Equipment Div.
DUPCATOR MACHINES
Gorton Machine Co., George
O'Neil-Irwin Mfg. Co.
DUPLICATORS
Detroit Universal Duplicator
Turchan Follower Machine Co.
DUST COLLECTORS
Acme Tool Co.
Standard Electrical Tool Co., The

EDGES—Straight
Acme Tool Co.
Challenge Machinery Co., The
Ford Motor Co., Johansson Div.
ELEVATORS—Portable
Economy Engineering Co.
END MILLS
Bokum Tool Co.
Gorton Machine Co., George
Putnam Tool Co.
Siewek Tool Div. of Domestic Industries, Inc.
U. S. Machine Tool Mfg. Corp.
Wesson Products Co.

END MILLS—Special
Detroit Reamer & Tool Co.
ENGINEERING SERVICE
Erickson Steel Co.
McKinney Tool & Mfg. Co., The
ENGRAVING MACHINES
Gorton Machine Co., George
Preis Engraving Machine Co., H. P.
ETCHERS—Acid, Pantographic
Preis Engraving Machine Co., H. P.
ETCHERS—Electric
Acme Tool Co.
Gorton Machine Co., George
Preis Engraving Machine Co., H. P.
ETCHING INK
Dykem Co., The
EXPERIMENTAL WORK
Merz Engineering Co.

FACERS
Clark Co., Robert H.
FEED FINGERS
Hardinge Brothers, Inc.
FEED REGULATOR—Drilling, Milling
Special Devices Co.
FEEDS—Air Operated
Bellows Co., The
Mead Specialties Co.
FEEDS—Die
Dickerman Mfg. Co., H. E.
FEEDS—Hitch
Dickerman Mfg. Co., H. E.
Die Supply Co.
FILES—Ebonite
Heller Brothers Co.
FILES—Rotary
Die Supply Co.
Ford Mfg. Co., Inc., M. A.
Grobet File Co. of America
Hamilton Tool Co., The
Heller Brothers Co.
Nicholson File Co.
Severance Tool Industries, Inc.
FILES—Swiss Pattern
Grobet File Co. of America
FILING MACHINES—Continuous
DoAll Company, The
FILING MACHINES—Die
Illinois Tool Works
Milwaukee Chaplet & Mfg. Co.
Oliver Instrument Co.
FILTERS—Air Line
M-B Products
FIXTURES
Bloomfield Tool Corp.
Bone Tool & Gauge Co.
Cleveland Universal Jig Co.
Dressel-Betz Co.
Electrix Corp.
Enterprise Machine Parts Corp., The
Federal Tool Corp.
General Die & Tool Co.
Lorain Machine & Tool Co.
Master Gauge Co.
McKinney Tool & Mfg. Co.
Merz Engineering Co.
Moore Special Tool Co., Inc.
Paramount Tool Co.
Sossner Tap & Tool Co.
Star Machine & Tool Co.
Ulmer Co., The J. C.
Viking Tool & Machine Corp., The
Vinco Corp.
FIXTURES—Broaching (See BROACHING FIXTURES)
FIXTURES—Grinding (See GRINDING FIXTURES)
FLEXIBLE SHAFTS
Precise Products Co.
FLEXIBLE SHAFT MACHINES
Acme Tool Co.
FLOATING HOLDERS
Gairing Tool Co., The
FORGINGS—Steel
Allegheny Ludlum Steel Corp.
Latrobe Electric Steel Co.
FORGINGS—Water & Oil Hardening
Allegheny Ludlum Steel Corp., Forging & Casting Div.
FORMERS—Wheel & Tool
Meyers Co., Inc., W. F.
FORMING TOOLS
Cooper-Bessemer Corp., The
Hardinge Brothers, Inc.
Wesson Products Co.
Wheel Trueing Tool Co.
FORMING TOOLS—Special
Detroit Reamer & Tool Co.
FURNACE HEATING ELEMENTS—Electric
Carborundum Co.
FURNACE REFRACTORIES
Carborundum Co.

FURNACES—Case Hardening
Cooley Electric Mfg. Corp.
Johnson Gas Appliance Co.
FURNACES—Electric Heat Treating
Cooley Electric Mfg. Corp.
Thermo Electric Co.
FURNACES—High Speed Steel
Johnson Gas Appliance Co.
FURNACES—Laboratory
Cooley Electric Mfg. Corp.
Thermo Electric Co.
FURNACES—Melting
Johnson Gas Appliance Co.
FURNACES—Soldering
Johnson Gas Appliance Co.
Yost Mfg. Co.
FURNACES—Tempering & Drawing
Cooley Electric Mfg. Corp.
Johnson Gas Appliance Co.

GAGE BLOCKS
Dearborn Gage Co.
Ford Motor Co., Johansson Div.
Scherr Co., Inc., George
Webber Gage Co.
GAGE HANDLES
Federal Tool Corp.
Great Lakes Metal Specialties & Mfg. Co.
GAGE TOOLS
Wheel Trueing Tool Co.
GAGES—Built-Up
Master Gauge Co.
Perfex Gage & Tool Co.
Turner Gauge Grinding Co.
Vinco Corp.
GAGES—Carbide Tipped
Kennametal, Inc.
Tools & Gages, Inc.
GAGES—Center, Depth, Planer, Telescoping, Surface, Thickness, etc.
Lufkin Rule Co.
Tools & Gages, Inc.
GAGES—Concentricity
Master Gauge Co.
GAGES—Contour
Perfex Gage & Tool Co.
GAGES—Cylindrical
Pipe Machinery Co., The
GAGES—Depth
Lassy Tool Co.
GAGES—Dial
Federal Products Corp.
Sun Tool & Gauge Corp.
GAGES—Fixture
Perfex Gage & Tool Co.
GAGES—Flush Pin
Master Gauge Co.
Perfex Gage & Tool Co.
Turner Gauge Grinding Co.
GAGES—Grinding
Acro Tool & Die Works
GAGES—Height
Dickerman Mfg. Co., H. E.
GAGES—I.D. & O.D.
Federal Products Corp.
GAGES—Inspection
Comtor Co., The
GAGES—Internal Indicator Bore
Swedish Gage Co. of America
GAGES—Internal Setting
Dearborn Gage Co.
GAGES—Master Disks
Swedish Gage Co. of America
GAGES—Micrometer Dial
Ames Co., B. C.
GAGES—Multiple Inspection
Federal Products Corp.
Tools & Gages, Inc.
GAGES—Plain Plug & Ring
Acme Industrial Co.
Carboloy Co., Inc.
Elgin National Watch Co.
Master Gauge Co.
Merz Engineering Co.
Perfex Gage & Tool Co.
Pipe Machinery Co., The
Rat-Way Industries
Swedish Gage Co. of America
Tools & Gages, Inc.
Turner Gauge Grinding Co.
Vard, Inc.
Vinco Corp.
GAGES—Precision
American Measuring Instrument Corp.
Bunell Machine & Tool Co.
Gage Co. Division
Pipe Machinery Co., The
Star Machine & Tool Co.
Tools & Gages, Inc.
Turner Gauge Grinding Co.
Woodworth Co., N. A.

BURKE

MILLING MACHINES

No. 4 Motor Driven MILLING MACHINE
Mounted on Cabinet Column

Burke motor driven milling machines Nos. 1, 2, 3, and 4 are specially suited for handling small, difficult work on a production basis.

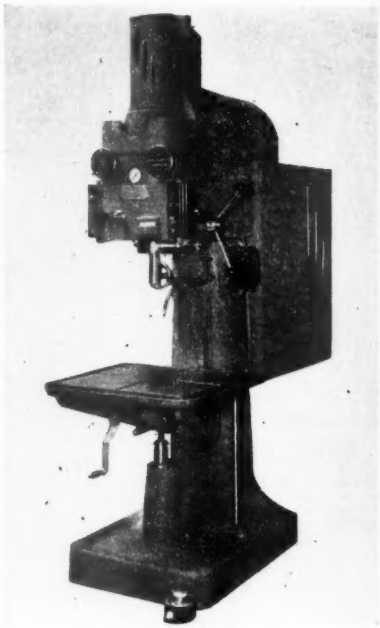
Write for complete information.

Burke Machine Tool Co.

301 E. 16th St. -:- Conneaut, Ohio

Lead Screw Tapping and Threading Machine

This tapping and threading machine was developed and built by The Cleveland Tapping Machine Co., Dept. J, 1725 Superior Ave., Cleveland 14, Ohio, for a leading manufacturer of aircraft parts. Although always lead screw controlled, the machine has rapid approach



and retraction of the spindle and is constructed so that the lead screw assembly is never disengaged from the spindle. The entire lead screw assembly slides in scraped ways and has a special locking device so accurate it can release then re-engage the lead screw assembly many times while the tap repeatedly passes through the same hole, yet the workpiece retains the same class fit of thread originally tapped. The tapping capacity of the machine of 2,000 holes per hour is possible because of these features: rapid approach and retraction of the spindle is controlled by two air cylinders which exert no air pressure on the spindle

GAGES—Profile
Gage Co. Division
Master Gauge Co.
GAGES—Snap
Master Gauge Co.
Perfex Gage & Tool Co.
Scherr Co., Inc., George
Tools & Gages, Inc.
Tubular Micrometer Co.
Turner Gauge Grinding Co.
Vard, Inc.
GAGES—Special
Acro Tool & Die Works
Barth Stamping & Machine Works
Federal Tool Corp.
Griffin Co., George O.
Lorain Machine & Tool Co., The
Metrical Laboratories, Inc.
Pipe Machinery Co., The
Sun Tool & Gauge Corp.
Swedish Gage Co. of America
Triangle Engineering Co.
Turner Gauge Grinding Co.
Ulmer Co., The J. C.
Vard, Inc.
Viking Tool & Machine Corp., The
Vinco Corp.
GAGES—Telescoping
Brand Tool & Supply Co.
Detroit Tap & Tool Co.
Federal Products Corp.
Mers Engineering Co.
Sossner Tap & Tool Co.
Tools & Gages, Inc.
GAGES—Thread Plug & Ring
Cadillac Gage Co.
Elgin National Watch Co.
Master Gauge Co.
Perfex Gage & Tool Co.
Pipe Machinery Co., The
Vard, Inc.
Vinco Corp.
GAGES—Tool Setting
Bartelt Engineering Co.
Tools & Gages, Inc.
GEAR BOXES
Western Aircraft Tool Co.
GEARS
Hartford Special Machinery Co., The
Taylor Machine Co.
GLOVES—Industrial
Industrial Gloves Co.
GRADUATORS
Gorton Machine Co., George
GRINDER TOOLS
Norton Co.
Clark Co., Robert H.
GRINDERS—Abrasive Band & Disc
Stuart Industries, Inc.
Walls Sales Corp.
GRINDERS—Attachments
Cincinnati Grinders, Inc.
GRINDERS—Automatic Cycle
Cincinnati Grinders, Inc.
GRINDERS—Bench & Pedestal
Delta Mfg. Co., The
Sanford Mfg. Co.
Standard Electrical Tool Co., The
GRINDERS—Carbide Tool
Delta Mfg. Co., The
Gorton Machine Co., George
Hammond Machinery Builders, Inc.
Lee Co., K. O.
Standard Electrical Tool Co., The
GRINDERS—Centerless & Center Type
Cincinnati Grinders, Inc.
GRINDERS—Chip Breaker
Delta Mfg. Co., The
Lee Co., K. O.
GRINDERS—Combination Twist Drill & Tap
Gallmeyer & Livingston Co.
GRINDERS—Cutter & Tool Attachments
Cincinnati Milling Machine Co.
GRINDERS—Crankshaft
Lempco Products, Inc.
GRINDERS—Cylindrical
Cincinnati Grinders, Inc.
J & S Tool Co.
Norton Co.
GRINDERS—Die
Standard Electrical Tool Co., The
GRINDERS—Disc
Besly & Co., Charles H.
Lempco Products, Inc.
Standard Electrical Tool Co., The
GRINDERS—Engraving Cutter
Preis Engraving Machine Co., H. P.
GRINDERS—External
Standard Electrical Tool Co., The
GRINDERS—Face
Oliver Instrument Co.
Standard Electrical Tool Co., The
GRINDERS—General Purpose
Hammond Machinery Builders, Inc.
Standard Electrical Tool Co., The
GRINDERS—Hand (See GRINDERS—Portable)
GRINDERS—Heavy Duty
Hammond Machinery Builders, Inc.
Standard Electrical Tool Co., The
GRINDERS—Hydraulic
Cincinnati Grinders, Inc.
Gallmeyer & Livingston Co.
GRINDERS—Internal
Abrasive Machine Tool Co.
Lempco Products, Inc.
Rivett Lathe & Grinder, Inc.
Sav-Way Industries
Standard Electrical Tool Co., The
GRINDERS—Plain, Center Type
Cincinnati Grinder, Inc.
GRINDERS—Portable
Chicago Wheel & Mfg. Co.
Dumore Co., The
Foredom Electric Co.
Precise Products Corp.
Standard Electrical Tool Co., The
GRINDERS—Potable Pneumatic
M-B Products
GRINDERS—Precision for Contours
Baker Bros., Inc.
Dumore Co., The
GRINDERS—Profile
Boyar-Schultz Corp.
GRINDERS—Ring Wheel
Besly & Co., Charles H.
Standard Electrical Tool Co., The
GRINDERS—Snagging
Standard Electrical Tool Co., The
GRINDERS—Stationary Pneumatic
M-B Products
GRINDERS—Surface
Abrasive Machine Tool Co.
Builders Iron Foundry
Delta Mfg. Co., The
Gallmeyer & Livingston Co.
Lempco Products, Inc.
Norton Co.
Reid Brothers Co., Inc.
Sanford Mfg. Co.
GRINDERS—Tap
Boggis & Co., Henry P.
Gallmeyer & Livingston Co.
Minn-Kota Foundry & Mfg. Co.
GRINDERS—Tool Bit
Oliver Instrument Co.
GRINDERS—Tool & Cutter
Boyar-Schultz Corp.
Cincinnati Milling Machine Co.
Cleveland Tool Engineering Co., The
Douglas Machinery Co., Inc.
Gorton Machine Co., George
Kearney & Trecker Products Corp.
Norton Co.
Oliver Instrument Co.
Production Machine Co.
Production Machinery Development Co.
Scherr Co., Inc., George
GRINDERS—Tool Post
Lempco Products, Inc.
Standard Electrical Tool Co., The
GRINDERS—Twist Drill
Gallmeyer & Livingston Co.
GRINDERS—Universal
Cincinnati Grinders, Inc.
Norton Co.
Production Machine Co.
Rivett Lathe & Grinder, Inc.
GRINDERS—Universal Tool & Cutter
Cincinnati Milling Machine Co.
Douglas Machinery Co., Inc.
Gallmeyer & Livingston Co.
Lee Co., K. O.
GRINDERS—Utility
M-B Products
GRINDERS—Vertical Spindle
Standard Electrical Tool Co., The
Stuart Industries, Inc.
GRINDERS—Wet Tool
Standard Electrical Tool Co., The
GRINDING & LAPPING—Precision
Acme Industrial Co.
J & S Tool Co.
GRINDING (Cylindrical) & POLISHING MACHINES
Hammond Machinery Builders, Inc.
GRINDING FIXTURES—Thread Tool
Clark Co., Robert H.
GRINDING WHEELS
Carborundum Co., The
Chicago Wheel & Mfg. Co.
DeSanno & Sons, A. P.
Norton Co.
GUIDE PINS
Danly Machine Specialties, Inc.
Die Supply Co.
HAMMERS—Board Drop
Chambersburg Engineering Co.
HAMMERS—Rawhide
Chicago Rawhide Mfg. Co.
HAMMERS—Replaceable Face
Greene, Tweed & Co.
HAMMERS—Single & Double Frame Forgings
Chambersburg Engineering Co.
HAMMERS—Soft Alloy
Industrial Products Suppliers
HAMMERS—Steam Drop
Chambersburg Engineering Co.
HAMMERS—Steel Inspector
Cunningham Co., M. E.
HANDLES—Gage
Tanzi Engineering Co.
HARD SURFACING
Scully-Jones & Co.
HARDNESS TESTERS
Ames Co., B. C.
Clark Instrument, Inc.
Shore Instrument & Mfg. Co., Inc., The
Wilson Mechanical Instrument Co., Inc.
HEADS—Boring (See BORING HEADS)
HEADS—Dividing
Cincinnati Milling Machine Co.
HEADS—Milling
Gorton Machine Co., George
HEAT TREATING
Perfection Tool & Metal Heat Treating Co.
HOBBERS—Gear (See GEAR HOBBERS)
HOBS—Hook Checking Machine For
Detroit Tap & Tool Co.
HOBS—Thread
Detroit Tap & Tool Co.
U. S. Machine Tool Mfg. Corp.
HOBS—Thread Milling
Pipe Machinery Co., The
U. S. Machine Tool Mfg. Corp.
HOLDERS—Adjustable
Ford Motor Co., Johansson Div.
HOLDERS—Broach (SEE BROACH HOLDERS)
HOLDERS—Drill
Armstrong Bros. Tool Co.
Rusnok Tool Works
HOLDERS—Steel for Number
Acromark Co., The
Cunningham Co., M. E.
HOLDERS—Tap
Procunier Safety Chuck Co.
HOLDERS—Tool
Acme Tool Co.
Allison Tool & Engraving Co.
Armstrong Bros. Tool Co.
Boyar-Schultz Corp.
Clark Co., Robert H.
Dearborn, Inc., Howard
Gairing Tool Co., The
Wesson Products Co.
HOLDING FIXTURES
Zagar Tool Inc
HOLE CUTTERS—Adjustable
Clark Co., Robert H.
HONING—Contract
Enterprise Machine Parts Corp., The
HONING MACHINES—Cylindrical
Automotive Maintenance Machinery Co., (Ammco)
HONING MACHINES—Horizontal
Enterprise Machine Parts Corp., The
Sunnen Products Co.
HOUSINGS—Aluminum Sheet
Conrad & Moser
HYDRAULIC MACHINERY
Peerless Machine Co.
Rockford Machine Tool Co.

IDENTIFICATION COLORS
Dykem Co., The
INDEX BASES
Allison Tool & Engineering Co.
INDEXING DEVICES
Hartford Special Machinery Co., The
INDEXING FIXTURES
Zagar Tool, Inc.
INDEXING HEADS—Universal
Cleveland Tool Engineering Co., The
INDICATORS
Lufkin Rule Co.
INDICATORS—Dial
Ames Co., B. C.
Federal Products Corp.
Scherr Co., Inc., George
INSPECTION DEVICES
Bartelt Engineering Co.
IRONS—Angle
Challenge Machinery Co., The

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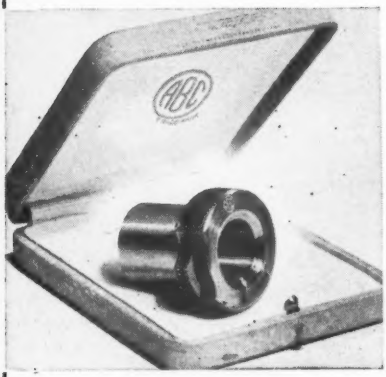

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when tapping; the rapid approach can be set to stop within .010" of the hole to be tapped; rapid retraction becomes effective the instant the tap leaves the work; and tap removal is twice as fast as tapping speed. The reversing mechanism is mounted on the drive shaft instead of on the tapping spindle and is actuated by two opposite bi-metallic clutches, one for the tapping cycle and one for the reversing cycle. Its action is so positive that the vertical spindle travel is controlled to within .005" limits while spindle rotation is held to 1/10th of a revolution. Thus the machine is especially adapted for blind hole tapping. Infinite speed variation is possible within the range of from 40 to 400 rpm, though higher speed ranges may be supplied. The quick adjustable variable speed drive and motor constantly revolve in the same direction as they do not reverse for the tapping cycle. The machine's tapping capacity on a production basis is from ⅜" to 3" in steel, right or left hand threads, class 3 fit. A dial wheel on the left side of the machine face controls the rapid traverse of the spindle, and a right hand dial wheel for control of the depth stop are both graduated in thousandths. The rapid approach can be set in thousandths anywhere up to 5" of travel and depth control can be set at from 1" to 6". A pilot light indicates motor operation. The gage on the machine front regulates the right pressure on the clutch for any size of tap or die. The bi-metallic clutch is sensitive enough to slip with the slightest application of additional torque, thereby saving the tap and workpiece. A speed indicator on the machine front always shows the spindle speed. An emergency stop button, like all the other controls, is located conveniently at the operator's finger tips. The oil pump and tank are in the machine base away from all dirt. The T-slotted table can be raised or lowered and locked in position with the same crank.

INFORM-A-GRAM KEY No. 242-C

We cannot stretch our paper, but . . . we can supply you with mighty helpful information in booklet form. These booklets, supplementing many of the valuable articles already published on our pages, are useful sources of information to have in your home reference or shop file. For a complete list of available booklets, see page 92.

JACKS—Machine
Armstrong Bros. Tool Co.
Enterprise Machine Parts Corp.

JIG BORERS
DeVlieg Machine Co.
Gorton Machine Co., George
Kearney & Trecker Products Corp.
Lorain Machine & Tool Co., The
Moore Special Tool Co., Inc.
JIG GRINDERS
Moore Special Tool Co., Inc.
JIGS
Acro Tool & Die Works
Bloomfield Tool Corp.
Bunell Machine & Tool Co., The
Cleveland Universal Jig Co.
Diesel-Betz Co.
Electrix Corp.
Enterprise Machine Parts Corp., The
Federal Tool Corp.
General Die & Tool Co.
Lorain Machine & Tool Co., The
Master Gauge Co.
McKinney Tool & Mfg. Co., The
Mers Engineering Co.
Moore Special Tool Co., Inc.
National Machine Tool Co.
Paramount Tool Co.
Rockford Die & Tool Works, Inc.
Schraner & Co., A. P.
Siewek Tool Div. of Domestic Industries, Inc.
Star Machine & Tool Co.
Ulmer Co., The J. C.
Viking Tool & Machine Corp., The

KEY SETS
Holo-Krome Screw Corp., The
KEYS—Socket Screw
Die Supply Co.
Holo-Krome Screw Corp., The
KNEES—Toolmakers'
Acme Tool Co.
KNOBS—Hand
Siewek Tool Div. of Domestic Industries, Inc.
KNURLING TOOLS
Armstrong Bros. Tool Co.
Brand Tool & Supply Co.
KNURLS—Steel
Mercury Metal Die & Letter Co.

LAPPING COMPOUNDS
Acro Tool & Die Works
Carborundum Co., The
LAPPING—Contract
Acme Industrial Co.
LAPPING MACHINES
Cincinnati Grinders, Inc.
Norton Co.
Schraner & Co., A. P.
LAPPING PLATES (See PLATES—Lapping)
LAPS
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Boyar-Schultz Corp.
Chicago Drillet Corp.
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General Die and Stamping Co.
South Bend Lathe Works
LATHE CENTERS
Kennametal, Inc.
LATHE CONVERTERS
Master Mfg. Co., The
LATHE DOGS
Armstrong Bros. Tool Co.
LATHE STOPS
American Products Co., The
LATHE TOOL CABINETS
Armstrong Bros. Tool Co.
LATHE TOOL POSTS
Armstrong Bros. Tool Co.
LATHE TOOLS
Armstrong Bros. Tool Co.
South Bend Lathe Works
LATHES—Back-Geared
Logan Engineering Co.
LATHES—Ball Bearing
Logan Engineering Co.
LATHES—Bench
Logan Engineering Co.
Rivett Lathe & Grinder, Inc.
South Bend Lathe Works
LATHES—Engine
South Bend Lathe Works
LATHES—Magnetic Polishing
Lima Electric Motor Co., The
LATHES—Manufacturing
Logan Engineering Co.
LATHES—Metal Working
Logan Engineering Co.
South Bend Lathe Works
LATHES—Precision
Hardinge Brothers, Inc.
Logan Engineering Co.
South Bend Lathe Works
Springfield Machine Tool Co., The
LATHES—Screw Cutting
Logan Engineering Co.
LATHES—Speed
Standard Electrical Tool Co., The
LATHES—Toolroom
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Logan Engineering Co.
Rivett Lathe & Grinder, Inc.
Sheldon Machine Co., Inc.
South Bend Lathe Works
LATHES—Turret
Logan Engineering Co.
South Bend Lathe Works
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Die Supply Co.
Dykem Co., The
Michigan Chrome & Chemical Co.
LEADER PINS
Die Supply Co.
LETTERS & FIGURES—Steel
Acromark Co., The
Mercury Metal Die & Letter Co.
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Economy Engineering Co.
Lyon-Raymond Corp.
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Vimco Mfg. Co.
LOCKS—Fixture
Siewek Tool Div. of Domestic Industries, Inc.
LUBRICANTS—Gage
Protective Coatings, Inc.
LUBRICATORS
M-B Products
Madison-Kipp Corp.

MACHINE PARTS
Enterprise Machine Parts Corp., The
MACHINERY—Precision
General Engineering & Mfg. Co.
MACHINERY—Special
Lorain Machine & Tool Co., The
Schraner & Co., A. P.
Triangle Engineering Co.
MACHINES—Abrasive
Stuart Industries, Inc.
MACHINES—Die Filing
Illinois Tool Works
Milwaukee Chaplet & Mfg. Co.
Oliver Instrument Co.
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Carl Zeiss, Inc.
MANDRELS
Lee Co., K. O.
MANDRELS—Expanding
Lee Co., K. O.
Young Arbor Co.
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Cunningham Co., M. E.
Mercury Metal Die & Letter Co.
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Dykem Co., The
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Acromark Co., The
Gottscho, Inc., Adolph
Preis Engraving Machine Co., H. P.
MASTER TYPE—Marking
Preis Engraving Machine Co., H. P.
METAL—Strenes
Advance Foundry Co., The
MEASURING INSTRUMENTS—Precision
Ames Co., B. C.
MICROMETERS
Brand Tool & Supply Co.
Lufkin Rule Co.
Scherr Co., Inc., George
Tubular Micrometer Co.
MICROMETERS—Inside
Tubular Micrometer Co.
MILLING & JIG BORING MACHINES
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MILLING MACHINE ARBORS
Cincinnati Milling Machine Co.
MILLING MACHINES—Attachments
Burke Machine Tool Co.
Cincinnati Milling Machine Co.
Gorton Machine Co., George
Kearney & Trecker Products Corp.
Rusnok Tool Works
MILLING MACHINES—Automatic
Cincinnati Milling Machine Co.
MILLING MACHINES—Bench
Ames Co., B. C.
Burke Machine Tool Co.
MILLING MACHINES—Continuous
Sommer & Adams Co., The
MILLING MACHINES—Dial Type
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MILLING MACHINES—Duplex
Cincinnati Milling Machine Co.
MILLING MACHINES—Horizontal
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Douglas Machinery Co., Inc.
Kempsmith Machine Co., The
Lucas & Son, Inc., J. L.
MILLING MACHINES—Hydraulic
Cincinnati Milling Machine Co.
MILLING MACHINES—Motor Driven
Burke Machine Tool Co.
MILLING MACHINES—Multiple Spindle
Cincinnati Milling Machine Co.
MILLING MACHINES—Plain
Kearney & Trecker Products Corp.
MILLING MACHINES—Plain, Universal
Cincinnati Milling Machine Co.
Douglas Machinery Co., Inc.
Kearney & Trecker Products Corp.
MILLING MACHINES—Precision
Hardinge Brothers, Inc.
Kempsmith Machine Co., The
Nichols & Sons, W. H.
MILLING MACHINES—Production
Diamond Machine Tool Co.
Kearney & Trecker Products Corp.
Nichols & Sons, W. H.
MILLING MACHINES—Profile
Cincinnati Milling Machine Co.
MILLING MACHINES—Rail Type
Cincinnati Milling Machine Co.
MILLING MACHINES—Rotary Head
Kearney & Trecker Products Corp.
MILLING MACHINES—Vertical
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Gorton Machine Co., George
Kearney & Trecker Products Corp.
Sommer & Adams Co., The
MILLS—Hollow
Gairing Tool Co., The
Genesee Mfg. Co., Inc.
MOLDING COMPOUNDS
Catalin Corp.
MOTORS—Electric
Lima Electric Motor Co., The

NAME PLATES—Engraved, Etched, Stamped
Acromark Co., The
NAME PLATES—Plastic
Eastern Etching & Mfg. Co.
NIBBLING MACHINES—Metal
National Machine Tool Co.
NOTCHING EQUIPMENT
Wales-Strippit Corp.
NUMBERING MACHINES
Acromark Co., The
Numberall Stamp & Tool Co.
NUT SETTER—Pneumatic
Aro Equipment Corp., The

OIL LUBRICATION SYSTEMS—Automatic
Rivett Lathe & Grinder, Inc.
OILS—Quenching & Tempering
Park Chemical Co.
OPTICAL COMPARATORS
Fish-Schurman Corp.
Scherr Co., Inc., George
Trico Products Corp.
OPTICAL FLATS
Acme Industrial Co.
Scherr Co., Inc., George
OPTICAL MAGNIFIERS
Cargille, R. P.
OVENS—Industrial
Johnson Gas Appliance Co.

PANS—Tote
Lucas & Son, Inc., J. L.
PARALLELS—Box, Flat, Solid
Acme Tool Co.
PARALLELS—Magnetic
Scherr Co., Inc., George
PARALLELS—Solid
Challenge Machinery Co.
PARALLELS—Toolmakers
Acro Tool & Die Works
Ford Motor Co., Johansson Div.
PHOTOCOPY EQUIPMENT
American Photocopy Equipment Co.
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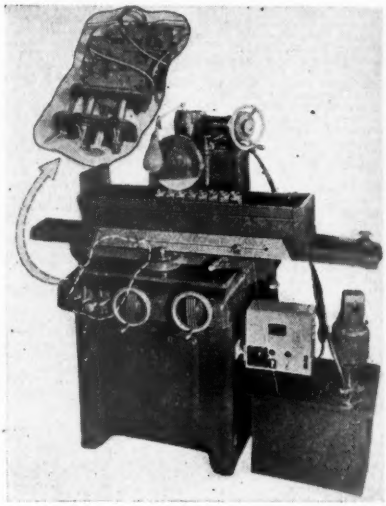

This new grinder produces a surface with precision to 6 micro-inches. The variable table travel of 0 to 50 ft pm with a cushioned reversing action operated by the pilot valve gives smooth, long life performance through a table control valve and a table reversing valve. The crossfeed action (indexing at the end of the table travel) is actuated by a hydraulic cylinder and can be controlled in infinite settings from .004 to .200. The crossfeed or traverse action in addition to hydraulic operation is also actuated by an accurate screw located in the center of the cross travel ways and can be held to split tenths of a thousandth for close tolerances on form and tool grinding with manual operation. When the automatic crossfeed is used for sharpening dies or any flat grinding to size, the crossfeed screw or manual drive is disengaged by a hydraulic cylinder.

INFORM-A-GRAM KEY No. 696.5-C

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Sav-Way Industries
PLASTIC MOLDING MACHINES—Injection
Lester-Phoenix, Inc.
PLATES—Angle
Acme Tool Co.
Smith Tool & Engineering Co.
Challenge Machinery Co., The
PLATES—Angle Adjustable (Sine Bar)
Nichols-Morris Corp.
Robbins Engineering Co.
Triangle Engineering Co.
PLATES—Angle, Compound
Angle Computer Co.
PLATES—Bench
Challenge Machinery Co., The
Delta Mfg. Co., The
PLATES—Cold (See COLD PLATES)
PLATES—Index
Vinco Corp.
PLATES—Lapping
Acme Tool Co.
Challenge Machinery Co., The
Delta Mfg. Co., The
Smith Tool & Engineering Co.
PLATES—Surface, Glass (See SURFACE PLATES, Glass)
PLUGS—Hollow & Socket Pipe
Die Supply Co.
Holo-Krome Screw Corp., The
POINT THINNER
Oliver Instrument Co.
POINTS
Ford Motor Co., Johansson Div.
Norton Co.
POLISHERS & BUFFERS
Hammond Machinery Builders, Inc.
Production Machine Co.
Sommer & Adams Co., The
Standard Electrical Tool Co., The
POLISHING GRAINS & POWDERS
Carborundum Co.
Norton Co.
POLISHING WHEELS—Rubber
Chicago Wheel & Mfg. Co.
PRECISION PARTS—Aircraft
Pipe Machinery Co., The
PRECISION PARTS—Hardened & Ground
Acme Industrial Co.
PRESSES—Air
Mead Specialties Co.
PRESSES—Arbor
Lempco Products, Inc.
Wilson, K. R.
PRESSES—Bench, Punch
Benchmaster Mfg. Co.
PRESSES—Broaching
American Broach Machine Co.
PRESSES—Drill
Baker Bros., Inc.
Delta Mfg. Co., The
Hamilton Tool Co., The
PRESSES—Flanging
Cincinnati Shaper Co., The
PRESSES—Hydraulic
Lempco Products, Inc.
PRESSES—Straightening
American Broach & Machine Co.
Denison Engineering Co., The
PRESSES—Utility or Shearing
Producto Machine Co., The
PRODUCTION JOB WORK
Rockford Die & Tool Works, Inc.
PRODUCTION MACHINE REPAIR PARTS
Enterprise Machine Parts Corp., The
PROFILERS
Acme Tool Co.
PROJECTORS
Scherr Co., Inc., George
PUMPS—Centrifugal
Ruthman Machinery Co., The
PUMPS—Circulating
Ruthman Machinery Co., The
PUMPS—Coolant
Ruthman Machinery Co., The
PUMPS—Lubricant
Ruthman Machinery Co., The
PUNCHES—Center & Drive Pin
Lufkin Rule Co.
PUNCHES—Interchangeable
Cincinnati Tool Co., The
PUNCHES—Hand, Toggle Action
Knu-Vise, Inc.
PUNCHES—Standard & Interchangeable
Hovis Screwlock Co.
Wales-Strippit Corp.
Whistler & Sons, Inc., S. B.
PUNCHING ATTACHMENTS
Dreis & Krump Mfg. Co.

REAMER DRIVES
Lee Co., K. O.
REAMERS
Black Drill Co.
Cleveland Twist Drill Co., The
Evans Reamer & Machine Co.
National Twist Drill & Tool Co.
Putnam Tool Co.
Super Tool Co.
Wesson Products Co.
REAMERS—Carbide
Super Tool Co.
REAMERS—Ground Flute
Lavallee & Ide, Inc.
REAMERS—Special
Detroit Reamer & Tool Co.
Lavallee & Ide, Inc.
Metal Cutting Tools & Mfg. Co.
REAMERS—Straight
Metal Cutting Tools & Mfg. Co.
REAMERS—Taper Pin
Lavallee & Ide, Inc.
RESINS—Cast
Catalin Corp.
RETAINERS—Punch & Die
Hovis Screwlock Co.
RIVETING MACHINES
Linley Brothers Co.
Tomkins-Johnson Co., The
ROLLER FEEDS—Automatic
Wittek Mfg. Co.
RUBBER ABRASIVES—Soft
Roberts Rubber Co., Weldon, (Brightboy Industrial Div.)
RULES—Steel
Lufkin Rule Co.

SALTS—Cyanide, Neutral & Hi Speed Steel
Park Chemical Co.
SANDERS
Wells Sales Corp.
SAWING MACHINERY
Tannewitz Works, The
SAWING MACHINES—Continuous
DoAll Company, The
SAWING MACHINES—Metal
Armstrong-Blum Mfg. Co.
Peerless Machine Co.
SAWS—Band
Barnes Co., Inc., W. O.
Kalamazoo Tank & Silo Co.
Tannewitz Works, The
SAWS—Diamond (See DIAMOND SAWS)
SAWS—Foundry
Tannewitz Works, The
Wells Mfg. Corp.
SAWS—General Purpose
Wells Mfg. Corp.
SAWS—Heavy Duty
Wells Mfg. Corp.
SAWS—Hole
Armstrong Blum Mfg. Co.
SAWS—Hydraulic
Peerless Machine Co.
SAWS—Tool & Die Shop
Wells Mfg. Corp.
SCALES—Ellipse
Martin Design Studios
SCALES—Steel
Lufkin Rule Co.
SCREW DRIVERS—Pneumatic
Aro Equipment Corp., The
SCREW MACHINE PRODUCTS—Contract
Star Machine & Tool Co.
SCREW MACHINES—Hand
Logan Engineering Co.
SCREWS—Hexagon Head Cap
Strong, Carlisle & Hammond Co.
SCREWS—Hollow Set & Shoulder
Die Supply Co.
Strong, Carlisle & Hammond Co.
SCREWS—Socket Head
Chicago Screw Co., The
Danly Machine Specialties, Inc.
Detroit Die Set Corp.
Die Supply Co.
Standard Pressed Steel Co.
Strong, Carlisle & Hammond Co.
SCREWS—Socket Head Cap
Holo-Krome Screw Corp., The
SCREWS—Square Head Set
Strong, Carlisle & Hammond Co.
SCREWS—Transfer
Die Supply Co.
SCREWS—Turn
Inter-State Designing & Tool Co.
SCRIBERS
Ford Motor Co., Johansson Div.
Lufkin Rule Co.
SHAFT MACHINES—Flexible
Haskins Co., R. G.
SHAFTS—Worm
Ace Mfg. Corp.

SHAPER TOOLS
Armstrong Bros. Tool Co.
SHAPERS
Ames Co., B. C.
Automotive Maintenance Machinery Co., (Ammco)
General Engineering & Mfg. Co.
SHARPENING STONES
Carborundum Co.
Norton Co.
SHEARS
Cincinnati Shaper Co., The
SHEARS—Bench
National Machine Tool Co.
O'Neil-Irwin Mfg. Co.
SHIMS—Stick
Industrial Products Suppliers
SINE BARS
Ford Motor Co., Johansson Div.
Vinco Corp.
SLOTTERS
Ames Co., B. C.
Douglas Machinery Co., Inc.
SLOTTERS—Universal
Douglas Machinery Co., Inc.
SPACERS—Arbor
Detroit Stamping Co.
Industrial Products Suppliers
SPANNERS
Armstrong Bros. Tool Co.
Sommer & Adams Co., The
SPECIAL MACHINERY
Builders Iron Foundry
Bunell Machine & Tool Co.
Enterprise Machine Parts Corp., The
Industrial Machine Co.
McKinney Tool & Mfg. Co., The
Merz Engineering Co.
Peerless Machine Co.
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Rockford Die & Tool Works, Inc.
U. S. Machine Tool Mfg. Corp.
SPEED CONTROL VALVES
Tomkins-Johnson Co., The
SPINDLES
Sav-Way Industries
SPOTFACERS
Bokum Tool Co.
Continental Tool Works, Div. of Ex-Cell-O Corp.
Wesson Products Co.
SPOTTING PASTE
Dykem Co., The
SPRINGS
Gibson Co., The, William D. (Div. of Associated Spring Corp.)
Muehlhausen Spring Corp.
SPRINGS—Die
Danly Machine Specialties, Inc.
Detroit Die Set Corp.
Die Supply Co.
Muehlhausen Spring Corp.
SQUARES—Combination, Try & Mitre
Lufkin Rule Co.
STACKERS
Economy Engineering Co.
STAMPINGS
Acro Tool & Die Works
Alofs Mfg. Co.
Detroit Stamping Co.
Federal Tool Corp.
General Die & Tool Co.
Gibson Co., The, William D. (Div. of Associated Spring Corp.)
Star Machine & Tool Co.
Variety Machine & Stamping Co.
STAMPINGS—Metal
Davis Tool & Engineering Co.
Dressel-Betz Co.
STAMPINGS—Precision
Gibson Co., The, William D. (Div. of Associated Spring Corp.)
STAMPS—Steel
Acromark Co., The
Cunningham Co., M. E.
Gottscho, Inc., Adolph
Hoggson & Pettis Mfg. Co., The
Mercury Metal Die & Letter Co.
New Method Steel Stamps, Inc.
Sossner Tap & Tool Co.
STEEL—Aircraft
Wheelock, Lovejoy & Co., Inc.
STEEL—Alloy
Allegheny Ludlum Steel Corp.
Bissett Steel Co., The
Columbia Tool Steel Co.
Darwin & Milner, Inc.
Wheelock, Lovejoy & Co., Inc.
STEEL—Alloy, High Nickel
Carpenter Steel Co., The
STEEL—Carbon
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Columbia Tool Steel Co.
Darwin & Milner, Inc.
Firth-Sterling Steel Co.

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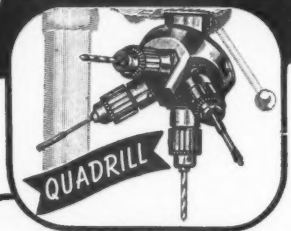
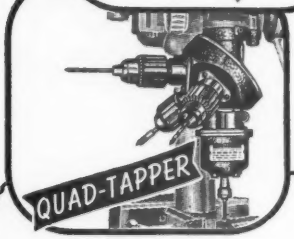




★ Your drill presses should be equipped with the QUADRILL 4-position turret attachment. It actually converts a single drill press into FOUR. More than that, it permits hi-speed tapping operations when the self-reversing QUAD-TAPPER (designed only for use with the Quadrill), is attached. The Quadrill and Quad-Tapper combine to form one of the greatest production tools presented to industry in years. In fact... the "blue book" of industry is already heavily represented among our many users.

Speed operations — eliminate costly lost motion moving from press to press. Save hours of time with this new, low-priced, precision-built unit ...the QUADRILL.

AT LEADING JOBBERS EVERYWHERE

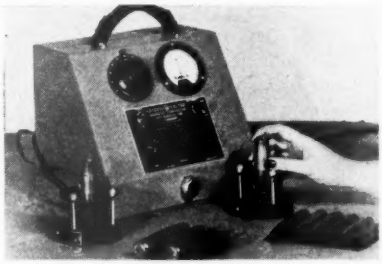
Act at Once — Immediate Deliveries — Write Today!

Guaranteed Satisfaction or Money Back

CHICAGO
DRILLET CORPORATION
919 S. Michigan Ave.
Chicago 5, Illinois

Redesigned G. E. Magnetic Comparator

For providing a quick, simple, non-destructive method of inspecting ferrous parts for quality control, this comparator made by General Electric Co., Dept. TD, Schenectady, N. Y., has been redesigned to permit a more functional arrangement of its components. Desirable for testing rods, bolts, springs, and small fabricated parts, this portable equipment immediately discerns variations in composition, hardness, or other characteristics which affect magnetic properties. Features of the redesigned comparator include an attractive new grey steel case with a sloping front panel on which are located the indicating instrument, variable voltage transformer, and the necessary rheostats and switches. Graduated dial plates on the sensitivity and balance control rheostats have been added to allow duplication of settings. In addition, a light now indicates whether or not the power is on. Receptacles for making connections to the test fixtures and power source are now located at the back of the case, thus keeping wires out of the operator's way and allowing a clear view of the indicating instrument. The redesigned instrument incorporates all the basic functions of the previous model. The circuit is balanced by placing an acceptable part in each of the two test fixtures. One of these parts is then removed and those to be tested are individually inserted. Any deflection of the instrument pointer indicates a deviation in magnetic characteristics from that of the standard.



INFORM-A-GRAM KEY No. 77-C

STEEL—Chromium
Darwin & Milner, Inc.
STEEL—Cobalt
Darwin & Milner, Inc.
STEEL—Cold Drawn
Bissett Steel Co., The
STEEL—Composite Die Sections
Allegheny Ludlum Steel Corp., Forging & Casting Div.
STEEL—Die (See STEEL—Tool & Die)
STEEL—Die Casting
Allegheny Ludlum Steel Corp.
Latrobe Electric Steel Co.
STEEL—Die Sections—Forged
Allegheny Ludlum Steel Corp., Forging & Casting Div.
STEEL—Drill
Crucible Steel Co. of America
STEEL—Electrical
Allegheny Ludlum Steel Corp.
STEEL—Graphitic
Timken Roller Bearing Co., The, Steel & Tube Div.
STEEL—Heat Resisting
Allegheny Ludlum Steel Corp.
STEEL—High Speed
Allegheny Ludlum Steel Corp.
Armstrong Bros. Tool Co.
Bokum Tool Co.
Cleveland Twist Drill Co.
Columbia Tool Steel Co.
Crucible Steel Co. of America
Darwin & Milner, Inc.
Firth-Sterling Steel Co.
Latrobe Electric Steel Co.
STEEL—Hobbing
Allegheny Ludlum Steel Corp.
Carpenter Steel Co., The
Firth-Sterling Steel Co.
STEEL—Mold
Allegheny Ludlum Steel Corp.
Carpenter Steel Co., The
STEEL—N.E. Analysis
Bissett Steel Co., The
STEEL—Punch, Chisel & Shock Resisting
Allegheny Ludlum Steel Corp.
Latrobe Electric Steel Co.
STEEL—Special Purpose
Allegheny Ludlum Steel Corp.
Crucible Steel Co. of America
STEEL—Stainless
Allegheny Ludlum Steel Corp.
Carpenter Steel Co., The
Crucible Steel Co. of America
Firth-Sterling Steel Co.
Latrobe Electric Steel Co.
STEEL—Strip, Hot & Cold Rolled
Allegheny Ludlum Steel Corp.
STEEL—Tool & Die
Allegheny Ludlum Steel Corp.
Armstrong Bros. Tool Co.
Carpenter Steel Co., The
Cleveland Twist Drill Co., The
Crucible Steel Co. of America
Columbia Tool Steel Co.
Darwin & Milner, Inc.
Firth-Sterling Steel Co.
Latrobe Electric Steel Co.
Wheelock, Lovejoy & Co., Inc.
STEEL PLATE—Fabricator
Detroit Die Set Corp.
STEEL PLATE—Ground
Die Supply Co.
STEEL PLATE—Rough or Machined
Torch Cut Shapes
Danly Machine Specialties, Inc.
Detroit Die Set Corp.
Die Supply Co.
STENCILS—Metal
Acromark Co., The
Gottscho, Inc., Adolph
SURFACE PLATES (See PLATES, Surface)
SURFACE PLATES—Granite
Herman Stone Co., The
SURFACERS—Disc and Belt
Production Machine Co.
SURFACING MACHINES—Belt Type
Production Machine Co.
SUTTONIZING
Welding Equipment & Supply Co.

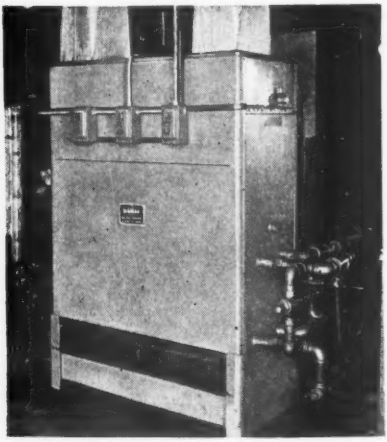
TABLES—Circular
Gorton Machine Co., George
TABLES—Elevating, Portable
Lyon-Raymond Corp.
Hamilton Tool Co., The
TABLES—Index
Gorton Machine Co., George
TABLES—Rotary
Acme Tool Co.
Gorton Machine Co., George
TABLES—Turn
Challenge Machinery Co., The
TAP EXTRACTORS
Clinton Machine Co.
TAP GRINDERS
Boggis & Co., Henry P.
TAP RECONDITIONING MACHINES
Detroit Tap & Tool Co.
TAPES—Measuring
Lufkin Rule Co.
TAPPERS—Hand
Bay State Tool & Machine Co.
Die Supply Co.
TAPPERS—Precision
Brand Tool & Supply Co.
Lassy Tool Co.
TAPPING HEADS
Procunier Safety Chuck Co.
TAPPING MACHINES
Detroit Tap & Tool Co.
Procunier Safety Chuck Co.
TAPS
Besly & Co., Charles H.
Detroit Tap & Tool Co.
Hy-Pro Tool Co.
Sossner Tap & Tool Co.
TELESCOPERS
Economy Engineering Co.
TEMPLATES
Gage Co. Division
THREADING TOOLS
Armstrong Bros. Tool Co.
U. S. Machine Tool Mfg. Corp.
TOOL BITS
Acme Tool Co.
Allegheny Ludlum Steel Corp.
Black Drill Co., Div. Black Industries
Boyar-Schultz Corp.
Carboloy Co., Inc.
Darwin & Milner, Inc.
Die Supply Co.
Super Tool Co.
Wesson Products Co.
TOOL SHANKS
Allegheny Ludlum Steel Corp.
Cooper-Bessemer Corp., The
TOOL STANDS
Scherr Co., Inc., George
TOOL STEEL (See STEEL—Tool & Die)
TOOLS
Acro Tool & Die Works
Alofs Mfg. Co.
Barth Stamping & Machine Works
Bloomfield Tool Corp.
Bunell Machine & Tool Co., The
Enterprise Machine Parts Corp., The
Kiffer Tool & Die Co.
McKinney Tool & Mfg. Co., The
National Machine Tool Co.
U. S. Machine Tool Mfg. Corp.
TOOLS—Carbide Tipped
Allegheny Ludlum Steel Corp.
Continental Tool Works, Div. of Ex-Cell-O Corp.
Firth-Sterling Steel Co.
Kennametal, Inc.
Super Tool Co.
TOOLS—Cutting (See CUTTING TOOLS)
TOOLS — Diamond (See DIAMOND TOOLS)
TOOLS—Flexible Shaft
Foredom Electric Co.
TOOLS—Machine
South Bend Lathe Works
TOOLS—Portable Electric
Acme Tool Co.
TOOLS—Precision
Fakes & Co., Joseph B.
Woodworth Co., N. A.
TOOLS—Recessing
Acme Tool Co.
TOOLS—Sintered Carbide
Allegheny Ludlum Steel Corp.
Firth-Sterling Steel Co.
TOOLS—Special (See SPECIAL TOOLS)
TOOLS—Special Cutting (See CUTTING TOOLS—Special)
TOOLS—Steel Marking
Cunningham Co., M. E.
TOOLS—Turning (See TURNING TOOLS)
TOOLS—Wheel & Thread Dressing
Wheel Trueing Tool Co.
TORCHES—Hand Gas
Johnson Gas Appliance Co.
TORCHES—Open Flame
Minn-Kota Foundry & Mfg. Co.
TORCHES—Soldering
Minn-Kota Foundry & Mfg. Co.
TRANSFER SCREW SET
Heimann Mfg. Co.
TRIG TABLES
Taylor & Associates, Herbert G.
TRUCKS—Hydraulic
Lyon-Raymond Corp.
TUBING—Tool Steel
Bissett Steel Co., The
TUBING—Welded Stainless
Carpenter Steel Co., The
TURNING TOOLS
Wheel Trueing Tool Co.
TYPE—Rubber
Gottscho, Inc., Adolph
TYPE—Steel
Acromark Co., The
Gottscho, Inc., Adolph
New Method Steel Stamps, Inc.
TYPE HOLDERS
Acromark Co., The
Mercury Metal Die & Letter Co.
New Method Steel Stamps, Inc.

V-BLOCKS
Challenge Machinery Co., The
Lassy Tool Co.
Lufkin Rule Co.
Scherr Co., Inc., George
VALVES—Air
Mead Specialties Co.
VISE JAW CAPS
Yost Mfg. Co.
VISES
Armstrong Bros. Tool Co.
Bay State Tool & Machine Co.
Gorton Machine Co., George
Ideal Tool & Die Co., Inc.
Producto Machine Co., The
Wesson Products Co.
Yost Mfg. Co.
VISES—Air
Bellows Co., The
Mead Specialties Co.
VISES—Bench
Acme Tool Co.
Yost Mfg. Co.
VISES—Drill Press
National Machine Tool Co.
Thomas Holst Co.
Yost Mfg. Co.
VISES—Machine
Cincinnati Milling Machine Co.
Gorton Machine Co., George
Producto Machine Co., The
VISES—Pipe
Yost Mfg. Co.
VISES—Milling Machine
Acme Tool Co.
Gorton Machine Co., George
Hartford Special Machinery Co., The
VISES—Precision
Vinco Corp.
VISES—Universal
Wesson Products Co.
VISES—Woodworkers' & Patternmakers'
Yost Mfg. Co.

WASHERS—Lock & Wrought
Die Supply Co.
WELDERS—Arc
Lee Co., K. O.
WELDING
Danly Machine Specialties, Inc.
WELDING ELECTRODES
Welding Equipment & Supply Co.
WELDING PLIERS
Knu-Vise, Inc.
WELDING POSITIONERS
Cullen-Friestedt Co.
Lyon-Raymond Corp.
WELDING RODS
Darwin & Milner, Inc.
WHEEL DRESSING TOOLS (See TOOLS—Wheel Dressing)
WHEELS—Abrasive
Besly & Co., Charles H.
WHEELS—Cutting Off
Carborundum Co.
WHEELS—Diamond (See DIAMOND WHEELS)
WHEELS—Mounted
Boyar-Schultz Corp.
Carborundum Co.
Chicago Wheel & Mfg. Co.
WHEELS—Sanding
Sand-O-Flex Corp.
WIRE FORMS & SHAPES
Gibson Co., The, William D., Div. of Associated Spring Corp.
WRENCH SETS
Armstrong Bros. Tool Co.
WRENCHES
Armstrong Bros. Tool Co.
WRENCHES—Reversible Ratchet
Greene, Tweed & Co.

NIAGARA Aero HEAT EXCHANGER

Removes Heat at Rate of Input — gives extra capacity for Increased Production



Heat treat quenching is no longer a haphazard process when you regulate the temperature of quenching baths with the NIAGARA AERO HEAT EXCHANGER. It removes heat at the rate of input, maintaining the exact temperature to produce uniform, specified physical properties. In continuous quenching systems it speeds production.

And since 95% of the cooling water is saved, the NIAGARA method pays for itself in a short time with direct economies.

For complete description write for Bulletin No. 96.

NIAGARA BLOWER COMPANY

Over 30 Years of Service in Industrial Air Engineering

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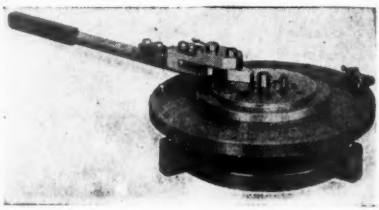
Field Engineering Offices in Principal Cities

NIAGARA

AIR ENGINEERING *EQUIPMENT*

Di-Acro Bender

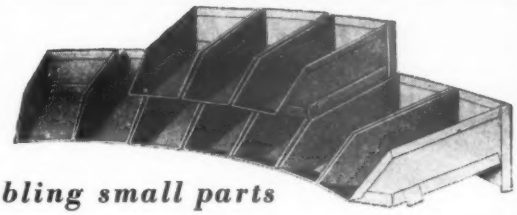
Redesigned and re-engineered the Di-Acro Bender now incorporates several major changes and improvements over the original models manufactured by O'Neil-Irwin Mfg. Co., Minneapolis 15, Minn. Operating friction has been greatly reduced in these new benders by the use of Torrington Roller Bearings which increases the ease of operation and adds considerable forming capacity to these precision units. A new feature



of the No. 2 and No. 3 size Di-Acro Benders is the instantly reversible lever control cam, which allows the operator a choice of either right or left hand forming direction. Interference, when forming several intricate shapes successively in a single piece, can be quickly eliminated through this two way operating feature by simply reversing the forming direction of the machine. The No. 3 Di-Acro Bender is illustrated above, also showing the operation of accurately forming tubing, without inside supporting mandrels, and a centered eye or light-weight pipe support. All types of forming can be done in all ductile materials. Literature on request to the Company, attention Dept. TJ.

INFORM-A-GRAM KEY No. 20-C

NEW BINS



for assembling small parts

Floors slope to feed parts to front — end reaching and fumbling.

Bins taper toward front to form convenient semi-circle — keep all bins within easy reach.

Nesting, locking construction for rigid set-ups, easily changed when necessary.

All-welded construction. Rolled, smooth edges.

Two sizes—tapered or straight edges. Hoppers available for steady work.

Manufactured and sold in Canada exclusively by Walter H. Wickware, Ottawa.

Write Stackbin Corporation, 97 Troy St., Providence 1, R. I., for further details and low prices.

STACKBIN SYSTEM

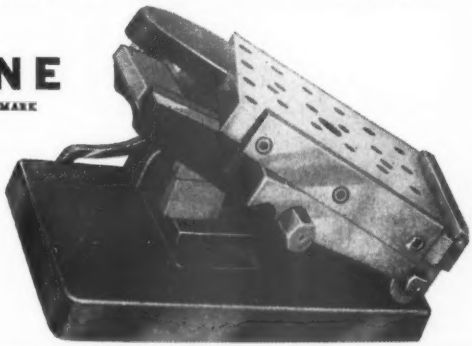
"Stacked and Still Accessible"

QUICK, ACCURATE ANGLE SET-UPS

with

ROTO-SINE

TRADE MARK



New method of obtaining both single and compound angles, quickly and accurately with gage blocks. For boring, drilling, machining operations. A dependable precision tool that pays for itself in quality control and increased production.

Available in 5 inch and 10 inch models.
Table sizes—
5" Model A— 5½ x 6
10" Model B— 7 x 12
10" Model C—10½ x 12

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DESIGNERS OF

TOOLS • DIES • GAGES • SPECIAL MACHINES AND PRODUCT DESIGN

410 E NINE MILE ROAD DETROIT, FERNDALE 20, MICH.

SPEED PRODUCTION
with *Quick Acting*
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- **Firebox** 7¾" high 13" wide 16½" long
- Write for complete specifications

For quick, accurate heat-treating high-speed steels, dies and tools. Reaches operating temperatures FAST to save time and gas. Gets the job done before conventional furnace warms up. Lined with high temperature refractory. Counterbalanced door opens upwards. 4-Burner Unit shown for temperatures 1400-2000° F. 6-Burner Unit for 1800-2400° F. Complete with Carbofrax hearth, G.E. Motor and Johnson Blower.

4-Burner $295

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575 E Ave., N. W., Cedar Rapids, Iowa

Please send me information on Johnson No. 130A. Complete Furnace Catalog.

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Dimensional Gaging by Air

A new air gaging system, known as Federal Metricator System of Dimensional Gaging by Air, is manufactured by Metrical Laboratories, Inc., Ann Arbor, Mich. Federal Products Corp., 1144 Eddy St., Providence 1, R. I., are exclusive sales agents. The system consists

of a graduated column, and a gaging head. A manometer tube, built into the water column, indicates variations in the air pressure.

The standard gaging head is constructed with two measuring orifices which are recessed with respect to the outer skirt of the gaging member. As the space between the measuring orifices and the part being gaged increases, the air flow increases and the water column rises in the manometer tube, resulting in a plus reading when gaging a hole diameter. Gaging an undersized hole will cause a decreased air flow giving a minus reading. Only one master is required for each gaging head. When this master is applied to the gaging head, the scale reads zero. By use of a reduced size measuring orifice, holes as small as .150" diameter and shoulders as narrow as .0937" can be precisely measured. Slots and grooves can be

Your Most Versatile "Handy Man"

PORTELVATOR *Portable Elevating Table*

For lifting, carrying, as work table, for overhanging work support, as in: tool rooms, machine shops, punch press rooms, stock rooms, freight docks, shipping rooms.

Various capacities, manual or power operated.

Write for Bulletin

THE HAMILTON TOOL CO.
HAMILTON, OHIO

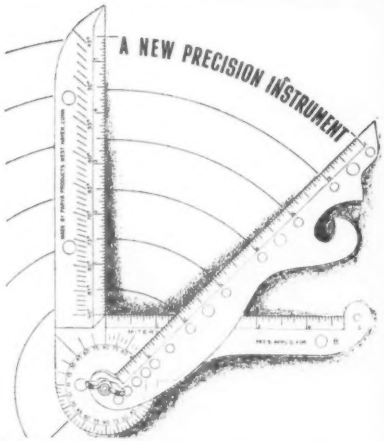
gaged from .0937" thick and up. The system operates under air pressure of approximately one pound, and can be attached to the regular plant air supply. If attached to a high pressure line, a regulator will reduce the pressure to the proper level. Amplification is four thousand to one, which means that measurements within .000025" are easily readable on the scale.

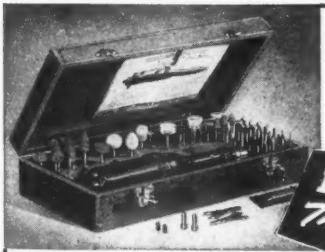
INFORM-A-GRAM KEY No. 4-C

★

The PARVA COMBINATION SQUARE, illustrated on the right, a new drafting aid which serves as a divider protractor, French curve, triangle, compass and ruler, is made by Precision Plastics Co. from thermoplastic material by the injection molding method.

INFORM-A-GRAM KEY No. E-78-C





MORE POWER
MORE SPEED
35,000 R.P.M. UNDER LOAD!

PRECISE *Thirty-five*

1/6 H. P.— WEIGHS ONLY 35 OZ.

GRINDS
MILLS
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Built to outwork the field; packs twice the power and twice the speed of any other electric handtool! Every shop, plant, and maintenance room needs PRECISE 35 for faster, smoother work on steel, non-ferrous metals, plastics, and most other materials. Speeds up to 35,000 r. p. m. under load reduce frictional wear on mounted wheels by as much as 200%.

Fully cased in durable, lightweight plastic and fully guaranteed shockproof without ground wire on AC or DC. For close jobs attach COOLFLEX Flexible Shaft to extend full power and speed to 9 oz. air-cooled hand piece.

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PRECISE PRODUCTS CO., 1341 CLARK ST., RACINE, WIS.

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12" LONG HIGH SPEED STRAIGHT SHANK DRILLS

9" FLUTE

Immediate Delivery

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12"	1/8"	$1.86
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	11/64"	2.15
	3/16"	2.25
	13/64"	2.34
	7/32"	2.45
	15/64"	2.54
	1/4"	2.63
	17/64"	2.73
	9/32"	2.82
	19/64"	2.93
	5/16"	3.02
	21/64"	3.18
	11/32"	3.36
	23/64"	3.56
	3/8"	3.75
	25/64"	3.95
	13/32"	4.14
	27/64"	4.29
	7/16"	4.49
	29/64"	4.62
12"	15/32"	4.76
	31/64"	4.85
	1/2"	4.88

EASTERN TOOL SUPPLY CO.

BARGAINS IN
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SEND FOR OUR CATALOGUE

Faxfilm Comparator Projector

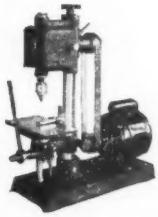
Two surfaces can be compared at 100 dia magnifications by Model C-1000 Faxfilm Comparator, manufactured by Rex D. McDill, Dept. D, 5107 Mayfield Rd., Cleveland 21, Ohio. Faxfilm produces an exact replica of a surface in clear plastic in less than a minute. Model C-1000 is a complete projection booth containing twin micro-projectors.

Two first-surface reflectors permit projection of two Faxfilm slides at full 100 dia magnification. Each 20" sq image appears beside the other on an inspection bench about 6" from the projectors, in which fine focus adjustments can be made. Faxfilm holder slides are movable so the direction of machine markings in each image can be matched and any part of one image can be placed beside any part of the other. Comparator use in receiving inspection permits quick inspection of finishes on incoming materials, while in production lines it reveals finishes obtained and conditions of cutting tools or grinding equipment.

INFORM-A-GRAM KEY No. C63-C

More Units Per Hour With

HAMILTON SENSITIVE TAPPER



For any threadable material. From smallest and finest threads up to and including 10-32.

For tapping operations on instrument, camera, watch, clock, business machines and all other precision work.

Write for Bulletin

THE HAMILTON TOOL CO. HAMILTON, OHIO

ARMSTRONG

No Finer Wrenches

Drop Forged Carbon and Chrome-Vanadium open end and box socket wrenches, and Chrome-Vanadium Steel Detachable Sockets with drop forged Ratchets—over 100 types, all sizes.

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ARMSTRONG BROS. TOOL CO.

"The Tool Holder People"

340 N. Francisco Ave., Chicago 12, U.S.A.

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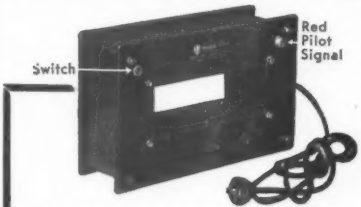
Saves • TOOLS • TIME • WORK

•AMC• DEMAGNETIZER



No tool room should be without one.

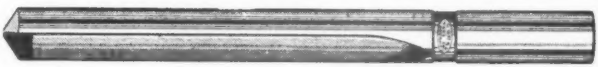
Small parts are instantly demagnetized. Large flat surfaces by sliding unit over surface. Write for descriptive folder on Standard units available for immediate delivery.

Special units to order.

ALOFS MFG. CO.

1619 Madison Grand Rapids, Mich.

GORAL CARBIDE TIPPED DRILLS



You can drill, counterbore or countersink in hardened steel with Goral Carbide Tipped Drills as easily as in mild steel with ordinary drills. On automatic machines, run at normal drilling speeds, costly down time is greatly reduced. But extremely high speeds are possible when desired.

Recommended for drilling hardened steel, cast iron, aluminum, bronze, brass, copper, plastics; also Goral Carbide Tipped Mason Drills for cement.

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GORAL TOOL CO.

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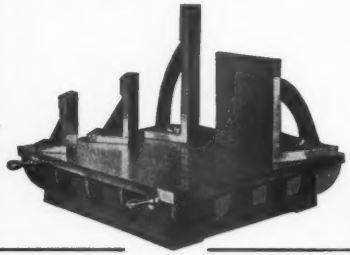
MILWAUKEE
Surface Plates



A full line of surface plates, angles and box parallels. Standard plate sizes from 8″x 8″ to 48″x 96″, larger sizes with or without legs. Plates are finish-planed and scraped to insure a very accurate surface.

Write for details

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NEW UNIVERSAL GREENFIELD GRINDER SPEEDS TOOL AND CUTTER GRINDING

The rugged GREENFIELD No. 4 Tool & Cutter Grinder is serving industry as an invaluable production and tool-room machine. The spindle design of the new and improved GREENFIELD Wheel Head incorporates generous bearing areas—scraped to fit and thoroughly run in. Quickly and easily set up attachments provide tool-room versatility for grinding formed cutters, taper and rose reamers, flat surfaces and compound angles. Send for detailed and illustrated job application bulletin.

PRODUCTION MACHINE CO.

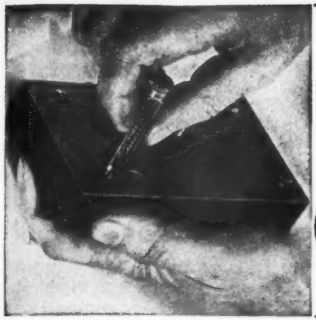
GREENFIELD, MASS.

Portable Hardness Tester

An instrument that makes practical the taking of a hardness test right where the material is, in the shop, yard, on the truck, railroad car, anywhere it may be, instead of taking a specimen to a testing machine, is announced by Steel City Testing Laboratory, Dept. TJ, 8843 Livernois, Detroit 4, Mich., and is iden-

tified as a Portable Hardness Testing Hammer Type "P". While the usual method of checking for hardness is by means of costly testing machinery, using especially prepared test pieces; in many instances it isn't at all necessary to obtain a scientifically accurate test of the material, but it is sufficient to know the hardness in regard to workability. With this self-acting hammer, it is done quickly, employing unskilled labor. Repeated tests can be made without readjusting the hammer. If material of a certain degree of hardness is to be selected, it is only necessary to see whether the diameter of the impression made corresponds to the desired degree of hardness. If the impression is smaller or larger, the specimen is either too hard or too soft, which can be checked with the microscope and chart supplied. The photograph above shows a test being made with a Type "P" Hammer.

INFORM-A-GRAM KEY No. E79-C



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It's a help that die makers, tool makers, machinery builders and general machinists have long sought—a more accurate and surprisingly faster way of transferring blind screw holes.

The Heimann Transfer Screw Set is a self-contained, complete tool. No wrenches or pliers are necessary. Made in 3/16″ to 1″ diameters.

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New Continuous Photo-Copyer

A new, 42" continuous printer for making photocopies is announced by American Photocopy Equipment Co., Dept. TJ, 2849 N. Clark St., Chicago 14, Ill., manufacturers of the A-PE-CO Photo-Copyer. This new model, CP-421, makes actual size copies of anything written, printed, drawn, typed or photographed, and is ideal for making photographic tracings from large blueprints up to 42" wide and of any length. Operation of the machine is simple and requires no technical training. The operator places the original, together with a piece of photo-copy paper, on the moving, endless belt, which takes it through the machine, exposes it, and deposits it, ready for processing, on a handy tray at the top of the machine. Variable speeds from one to 20 fpm are obtained by turning a knob at the operator's right.

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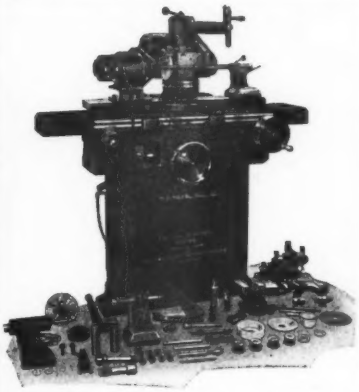

Grand Rapids No. 60 Universal Cutter & Tool Grinders feature cabinet base, ball bearing table and fixed table height, backed by 35 years of know how.

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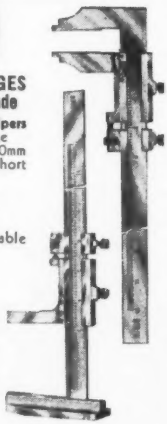

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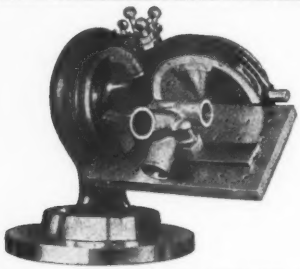
NEW YORK 18, N. Y.



Computes Angles QUICKLY

The Studler Angle Computer so simplifies layout of die work, survey of castings, and inspection of precision-machined parts that users report it is doing the work in one-half to one-tenth of the time required by the sine bar method. Only one set-up is required. The work shown above was accurately surveyed in 15 minutes.

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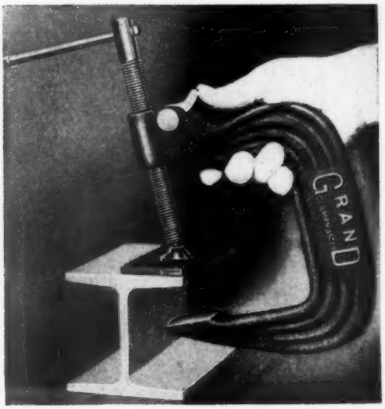
STUDLER ANGLE COMPUTER

Extra Deep Throat Speed Clamp

A new line of "C" Clamps, known as the Grand ASL Extra Deep Throat Speed Clamp, has been announced by Grand Specialties Co., Dept. TJ, Grand Ave. at Troy, Chicago 22, Ill. This new clamp is an addition to their regular line of extra deep throat clamps, and incorporates "quick action" features. The clamp can be positioned instantly



by simply pushing down on the ratchet screw (eliminating time and motion required to run down the conventional type of clamp screw) and tightening with a turn of the loose-proof handle. The clamp releases instantly by merely loosening the handle and pushing with the thumb on the trigger release pawl which frees the ratchet screw so that the clamp is ready immediately for application to work of any size or thickness. This clamp will hold work with a firm tension grip on any surface, slanting or irregular, and is equipped with replaceable ball and socket swivel to prevent shifting or creeping. The trigger release pawl has hardened teeth which hold a meshed grip under spring tension on the ratchet screw while clamp is set. These clamps are made of alloy-steel, welding spatter protected by copper plating, and rust-proofed with baked enamel finish.

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By changing the blades, rods, angles, and flat bars can be cut with this machine.

Catalog No. 8 available

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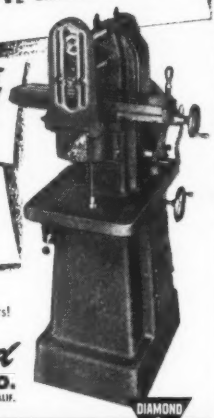
MODEL M-26 *Diamond*

PRECISION 1½ H.P. MILLER



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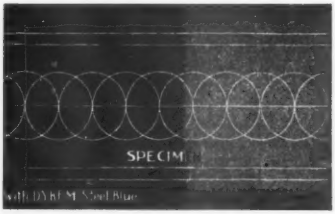

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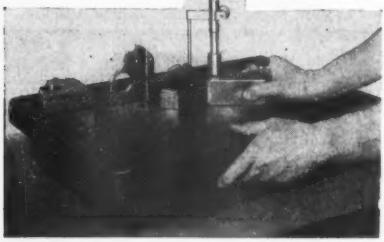

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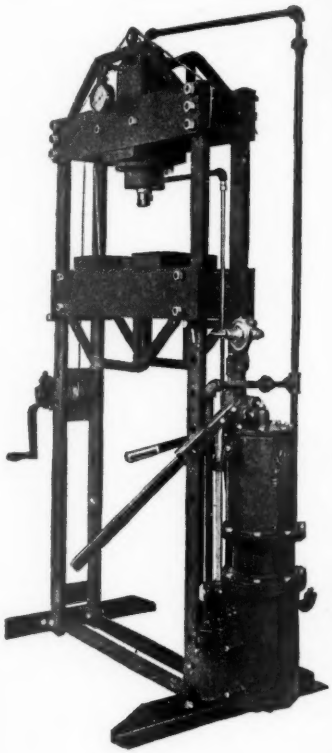
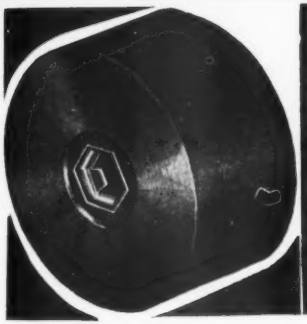
Operative speed has been an important factor in the design of the K. R. Wilson Hydraulic Arbor Presses. To accomplish this, mechanical and hydraulic actions have been utilized. The operating mechanism consists of a "Capstan" type hand wheel through which the ram



is raised and lowered; a ball arm operated valve; and a two speed hydraulic pump. The KRW features of ram movement and control, combining mechanical and hydraulic pressure to a single ram, have many advantages. Jobs which apparently require little pressure are placed under the ram which is brought down quickly by the "Capstan" type hand wheel. By extending the sliding handles an estimated pressure of 3 tons can be applied. However, if still greater



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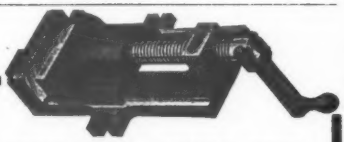

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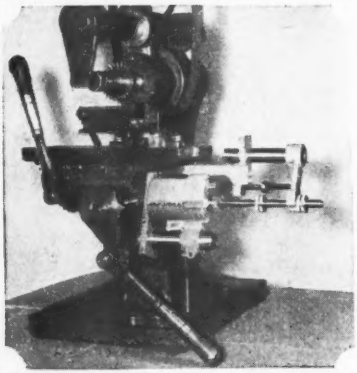

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pressure is required, the ball arm is flipped which closes the valve and the ram is hydraulically operated by using the double plunger speed of the pump. During the first operation of the "Capstan" hand wheel the hydraulic cylinder was filled with oil, so that the pressure begins to build up on the first stroke of the pump. If still greater pressure is required, a half turn of a winged finger lever and continued pumping will bring the pressure up to the rated capacity of the press. At no time was it necessary to reduce the pressure or move the work from its original position under the ram.

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A more than 60 percent increase in the number of sizes of "Detroit Standard" thread milling cutters carried in stock ready for thread grinding to customer's specifications has been announced by Detroit Tap and Tool Company, Dept. DJ, 8432 Butler Ave., Detroit 11, Mich. The standard cutters now available include 12 new shell type cutters, making a total of 52 shell type standards; and 20 new shank type cutters, making a total of 32 shank type standards. All of the new shank type cutters are available in either Jarno, Morse, or Brown & Sharpe tapers, as are the original standards. The expanded line of standards represent largely additional sizes as to width of the cutter face and the diameter. These now permit the user to select a standard cutter of either the exact size or so close as to enable economical substitution for all major thread milling operations. Sizes range from 1½" in diameter and ½" face width to 3½" diameter and 2" face width in ¼" steps from 1½" to 2½" diameters and in ½" steps above 2½" diameter. "Detroit Standard" thread milling cutters are available with virtually any thread form, for both internal and external thread milling.

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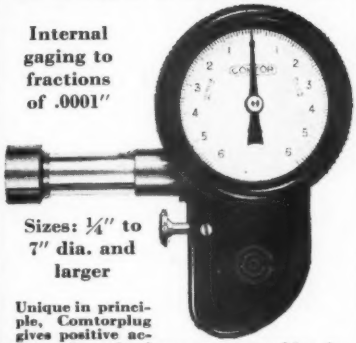

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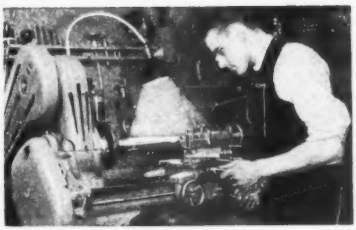

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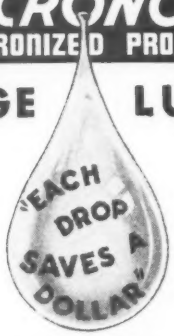

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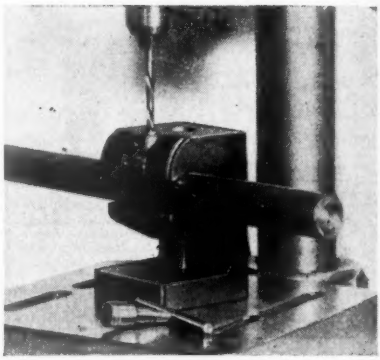

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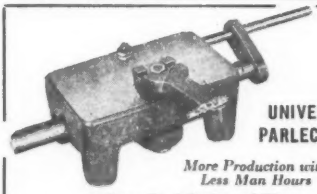

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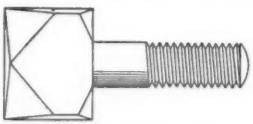

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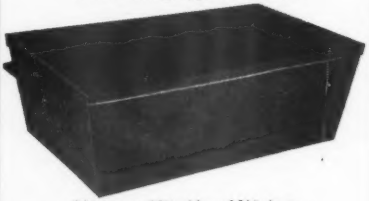

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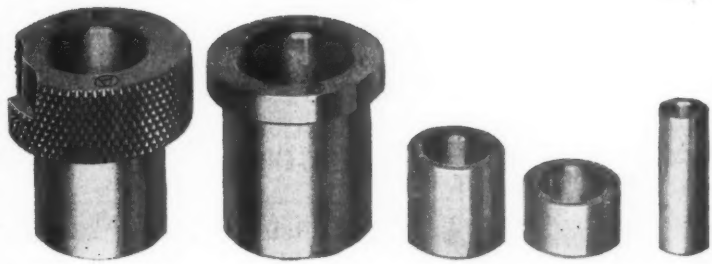

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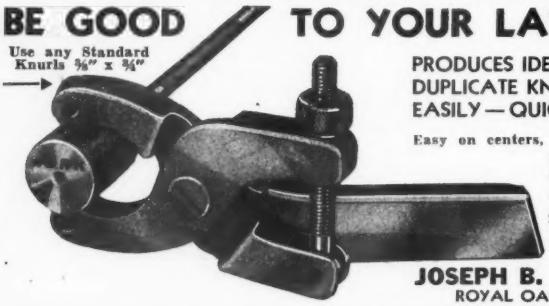

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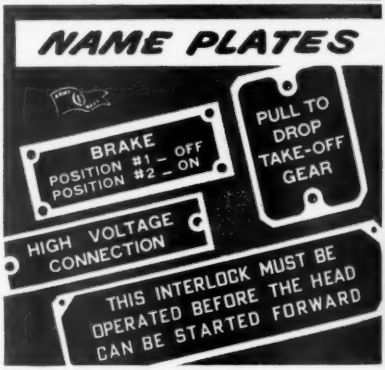
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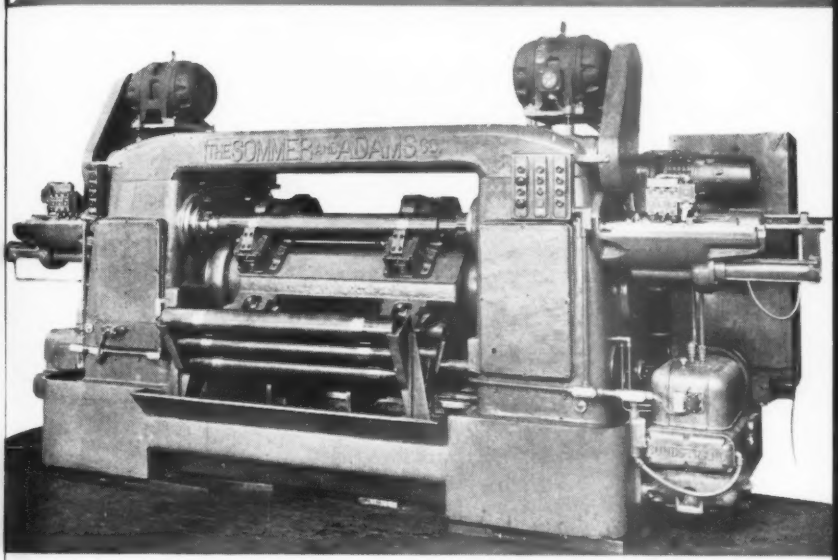

Hydraulically-Operated Double-End Machine for Boring, Facing and Tapping Steel Tubes Used for Munitions. Loading, chucking, entire cycling and unloading of tubes completely automatic. Index hydraulically operated. Equipped with collapsible taps to allow for rapid return of tapping spindles. Readily adaptable to other double-end boring, facing and tapping operations.

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For quick reference see our section in Sweet's File—Mechanical Industries or write for catalog.

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